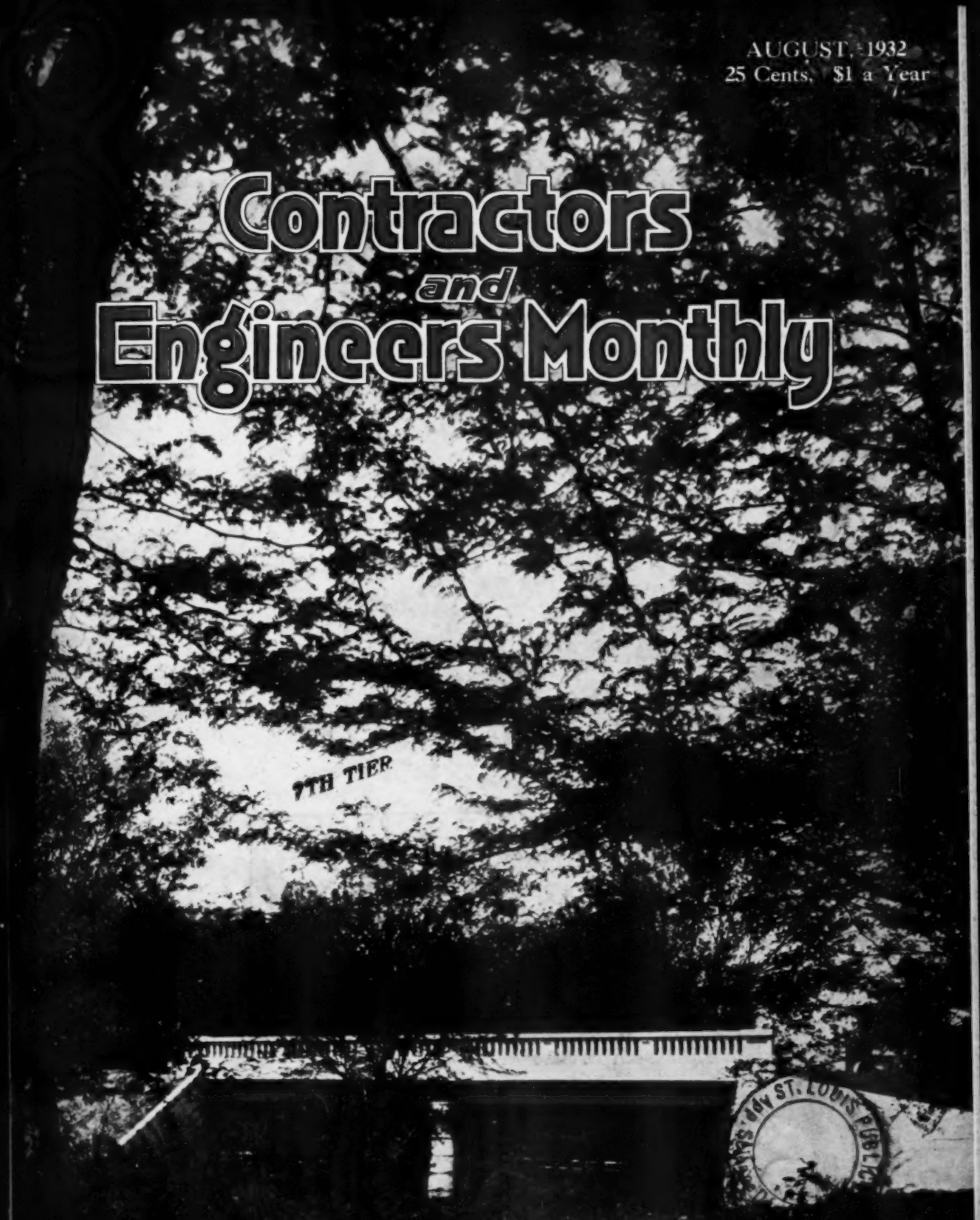
AUGUST, 1932
25 Cents, $1 a Year

Contractors and Engineers Monthly



Economical Methods
Concrete Bridge Construction
in Tennessee,
Described in This Issue.

Ingenuity Aids Contractor

To Produce Better Paving

Bringing Up Burlap Along the Shoulder

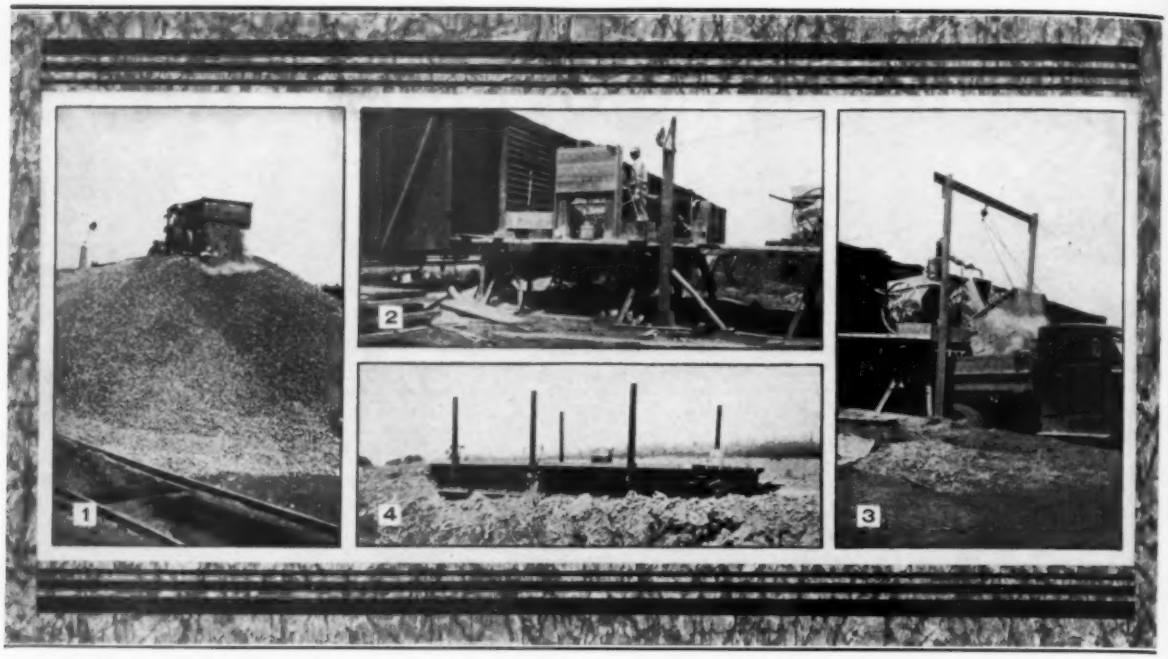
Central Engineering Company Has Developed Steel Horses for Cement Dock and Steel Sled for Hauling Forms As Well As Other Helpful Devices

ONE measure of the ability of a contractor to handle his work satisfactorily is the number of new devices he develops himself to make the work easier, speedier or more accurate. The question of economy enters into all of these for if a man's work is easier he will produce more, or if the work is more accurate there will be less lost time in arguments with the inspection staff, and if it is speedier the overhead per square yard of pavement is cut. The Central Engineering Co. job running north from Ainsworth, in the southeastern section of Iowa, was filled with novel devices that helped the contractor in many ways.

The cement dock, instead of being set up on nail kegs as we saw one dock or being built up of sills and timber that had to be torn down for every move and part of the lumber lost, was mounted on well-designed steel horses built up from structural steel sections so that the dock was set up in units 16 feet long. These horses could be used parallel with or at right angles to the line of the rails and were thus useful in any kind of a set-up.

A steel sled was used for bringing forward ninety forms at one trip, using a Sixty tractor to pull it. This particular sled would be of more use in Illinois than in Iowa for the former state has wider shoulders on which the sled could be moved very easily. It was built of structural steel with the runners of I-beams turned up at the ends so that the sled could be pulled in either direction with equal ease. The floor of the sled was of 2 x 8-inch timber and there were posts of 2½-inch pipe to keep the loads from falling off. A heavy chain was attached at either end for hauling with the tractor.

A third major item of interest on this job was the device for setting the longitudinal joint strips. The premoulded joint material comes in strips 8 feet long and 2½ inches wide. The superintendent had developed a device that fitted into the slot cut by the wheel on the finishing machine. By stepping on the device the strip was placed straight and true. The setting machine consisted of a cap just the size of the strip and into which



MATERIAL HANDLING ON THE CENTRAL ENGINEERING CO. CONTRACT AT AINSWORTH, IOWA

1. An acetylene light on the stockpile permitted night work. 2. The cement dock and scales supported by steel horses. 3. The trap for dumping the cement into the batch trucks. 4. The steel sled which was pulled by a Sixty tractor and used to bring up about 90 sections of steel forms for the road.

the strip was placed while the machine was set upside down at one side of the double bridge from which the longitudinal float was used. The float was carried on the other side of the bridge. The cap was attached to a handle made from a tube, straight for 3 feet in the center and sloped to the ends. The tube was of aluminum to make the device as light as possible. Between the first tube and the cap was a second similarly shaped tube with two pin guides to keep it in line. The second tube handle was attached to a strip carried just above the cap and with a series of pins spaced about 4 inches apart which went through the cap. These were used to eject the strip when the device had placed it properly.

In use the device worked out very satisfactorily. The two men who used it and the longitudinal float were one of the finest teams for synchronized motion that we have been privileged to see. Immediately after floating across a section, they put the float in its rest, stepped off the bridge, pushed it forward, and immediately placed a strip of dummy center joint material in the inserting machine. They then took a 2 x 12-inch plank out to the center of the bridge by means of two wires with handles and returned for the inserting machine, this time both men walking out on the same side. They inserted the machine in the slot, stepped on the outer section at the two ends to press it firmly into the slot and then put their feet into the inner section and pulled up on the outer section which ejected the strip right in the slot and as straight as a ruler. The men then walked back, setting the machine in the rack, walked across the two sides of the bridge and, after removing the center plank, floated across the newly placed strip twice. The process was repeated with the minimum effort and no false or wasted steps.

How the Job Was Run

The fine grade was cored out by subcontract with a Northwest shovel. The grade was then bladed and followed with the Ted Carr Formgrader. As mentioned before, the forms were brought up ninety at a time on the steel sled and distributed along the right of way. A crew of six men set the forms and trimmed the trench ahead for the forms. There were only four men doing hand work on fine grade with a Caterpillar Hi-Way patrol grader with a 6-foot blade cutting the thickened edge section for a distance of 4 feet from the forms. After the 10-inch Blaw-Knox forms had been set the Hug subgrader was pulled over by one of the tractors and then four more men on fine grade shoveled the windrows out to the shoulder. The grade was rolled to uniform firmness with a Fordson 3-ton roller. Back of the Blaw-Knox turntable and ahead of the paver were three men tamping and lining up the forms. The man that oiled the forms also laid in the longitudinal center bars ready for threading through the subgrade planer pulled by the paver.

Aggregates and Cement

Both sand and gravel for this job were shipped in by the Automatic Sand & Gravel Co. of Muscantine, Iowa, in gondola cars that were unloaded by a P & H crane with a 40-foot boom and a 1¼-yard Owen clamshell bucket. The Johnson bins and batchers were set close to the spur and readily reached by the crane in spite of the somewhat shorter boom than is usually used. The crew which handled the unloading and dispatching of the batches consisted of two men in the cars, the crane operator, and a batcher man who checked the tail gates of the trucks as they stopped for the batches to see that

the gates were tight, weighed and dumped the batches and gave each truck driver a ticket for the batch. The hauling was done partly by individual truck owners, there being about fifty trucks for the maximum 7-mile haul. Of these twenty-four were owned by the contractor and the balance by individuals. The batches were made up of 1,744 pounds of gravel, 1,465 pounds of sand and 669 pounds of cement. The crane unloaded an average of fifteen cars of aggregate a day.

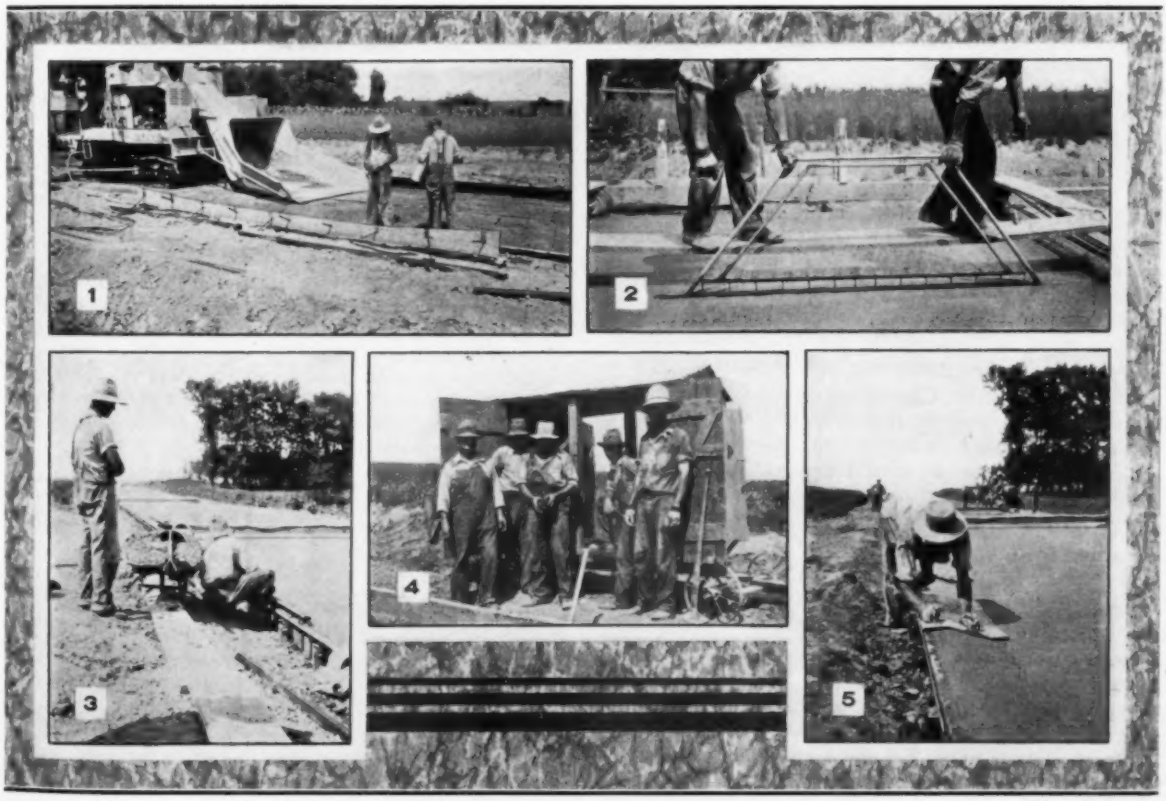
THE CEMENT DOCK

The cement dock was built for but one car of cement at a time. This may not have been as great a disadvantage in this particular case as with shorter hauls and multi-batch trucks for there were always so many batches on the way to the paver that the time lost in moving a car of cement was not noticed at the paver. There were four men shoveling in the car and loading the cement carts and one man wheeling, weighing and dumping. The handling of the cement was subbed.

The contractor was using the single-car dock only temporarily at the location visited and was ready to extend it very shortly. The dock was built in 16-foot sections on the steel horses already described. Planks of 3 x 12-inch stock were used as the flooring. The trap was of 1 x 12-inch lumber planed, lined with galvanized iron and had a canvas drop to prevent scattering of the cement. There was remarkably little cement lost when the carts were dumped but when the trucks pulled away from the pit the canvas dragged out an appreciable amount of cement. On approaching the cement dock and when stopping to await their turn the truck drivers shoveled the sand against the tail gate of the truck to prevent any leakage of cement during the trip over the rough grade. After backing in and receiving the cement, the truck moved out to clear for the next truck and stopped while the driver shoveled sand over the cement to prevent loss. On the grade the trucks were turned on a Blaw-Knox turntable and the operator took the precaution to sprinkle the grade around the turntable so that the dust would not cause trucks returning from the paver to run into the turntable and cause an accident.

AROUND THE PAVER

One man at the end of the grade dumped the batches into the skip of the Rex 27-E paver. A man just ahead of the paver and working on the shoulder made up the expansion joints for which the contractor kept two setting machines in readiness so that there would be no delay in having a joint ready to set every 60 feet of pavement. The joint was made up in the machine with the caps in place, the dowels through the premoulded Sealtite expansion joint, and the steel sleeves on the dowels in the side toward the paver. Two men shoveled from the Koehring subgrade planer which was pulled by



DETAILS OF THE PAVING END OF THE CONTRACT

1. *An 18-foot expansion joint with dowels in the setting machine ready to be placed in the slab.* 2. *The device for setting longitudinal joint strips.* 3. *Heavy planks along the shoulder took the back-ache out of wheeling concrete for the lip curb.* 4. *The form setting crew grouped around one of the portable tool houses.* 5. *Pushing the "Iron Mule" in finishing a section of lip curb.*

the paver. There were two steel men who handled the placing of the single side bar, the two longitudinal center bars placed 9 inches either side of the center line of the pavement, and the transverse bars each 11 feet in length and spaced 3 feet apart with the ends alternately placed at a distance of 6 inches from one form and then the other. The transverse bars were wired to the other bars wherever they crossed. The steel men also placed the 11-foot bars which were bent into "hairpins" and placed eight at each expansion joint.

One man placed and renewed the tar paper that covered the grade completely behind the paver and ahead of the actual pouring of the concrete. The rolls were 38 inches wide, requiring six to cover the entire width of the 18-foot slab. There were two puddlers who also handled all the spading at the sides. This was an unusual combination, for the work of puddling is usually considered to be sufficient to keep two men very busy without any spading.

The Ord finisher carried the cutting wheel for the center dummy joint which was cut on the second pass of the finishing machine. As described in the opening paragraphs of this article the longitudinal float men inserted the premoulded center strip material with a machine which the contractor designed particularly for this purpose. Following the float men were the two finishers who checked the slab with the straight-edge, then used the drag straight-edge if necessary but the use of floats was dispensed with as far as possible. Two belts each 8 inches wide were used to complete the finishing.

On lip curb which is placed uniformly 3 inches high and 12 inches wide on all super-elevated curves and on both sides of the slab on all grades, the contractor used three men on a side, one wheeling back the concrete, one shoveling to the forms and a finisher. A novelty in the manner of handling the wheeling of the concrete was the use of 2 x 12-inch planks from the paver back to the section where lip curb was being run for the wheelbarrows to go on. We have seen sturdy men desperately pushing a wheelbarrow against the rough shoulder trying to get concrete back to the lip curb crew. We have seen many types of trays which the puddlers filled as they came to them for the use of the lip curb men, but this is the first time that the obvious method of wheeling concrete back to the curb on a plank has been noted. In this manner not only is the work of the wheeler made much easier but the concrete arrives at the curb in the very best condition direct from the paver instead of having stood for an indeterminate period in a tray on the shoulder.

Behind the lip curb finishers was the man pulling the caps from the tops of the expansion joints. He worked from a single bridge resting on the forms. He pulled the caps and edged the joints. Following him were two men spreading burlap and sprinkling it. The covering of the slab the following day with a 2-inch cover of earth, after the burlap had been removed and the slab checked for bumps over ⅛-inch high, was done by subcontract. Six men pulled the forms and covered the slab while two or three men were required to sprinkle the cover for the period of seven days specified.

WATER SUPPLY

The water supply for this job was furnished by two Barnes triplex pumps working toward the center. One pump was located a mile beyond the north end of the job and the second about 3 miles from the north end. The batching plant was located at Haskins ½-mile off the right of way and about 2½ miles from the Ainsworth or south end of the job. The pumps delivered the water to the job through 2-inch pipe with the taps for the paver hose spaced about 200 feet apart. The paver carried about 150 feet of 1½-inch hose. Railroad air hose couplings were used to make the connections between the paver hose and the line. Two sections of air hose with the connections on them and each about 3 feet long were carried along. When one was being used the second was attached to the next tap ahead ready for the shift.

PERSONNEL

This Project F-324 which averaged 100 feet an hour throughout the work was completed by the Central Engineering Co. of Davenport, Iowa, for which Fritz H. Schmidt was Superintendent. A. N. Kreymer was Resident Engineer for the Iowa State Highway Commission.

Speed Records on New Welded Pipe Line in California

WELDING operations on the 26-inch natural gas transmission line from Kettleman Hills to Los Angeles have established several speed records for pipe line construction. Using the shielded arc process, field welds were made at the rate of 22 per crew per 9-hour day with an actual welding time of 17 minutes per joint. This included cleaning and brushing two beads of weld metal. A section of 124 miles was welded by the eight field crews of H. C. Price, Inc., of Bartlesville, Okla., in 112 days of 9 hours each.

On this line 40-foot lengths of pipe were strung beside the ditch. The lining up and tacking crew fitted the double bell end pipe with a backing-up ring 3 inches wide and ¼-inch thick. The pipe was beveled at 25 degrees. The lining up gang inserted rollers under the pipe as the section was tacked in only one place. The field welding gang in eight 3-men units and with eight gasoline engine-driven Lincoln stable arc welders, followed the tacking crew. One helper turned the pipe and the other stood by to scale the bead. The operators used 3/16-inch Fleetweld electrodes in the 18-inch length. Bell hole welds were made with 3/16-inch diameter electrodes in 45 to 60 minutes time per joint. This line is 100 per cent arc welded from Kettleman Hills to Los Angeles. Expansion joints, gates, by-passes and all fittings were welded into a single unit with the arc. Tensile and bend tests and air pressure and soap suds tests were made in the field.

A General View of Welding Operations on the Kettleman Hills 26-inch Pipe Line

Storm Water Sewer Construction in Wet Ground

The Header and Well Point Risers

Alvon Contracting Corp., Brooklyn, New York Struck Bad Section in Sheepshead Bay Sewer

AN area of about 435 acres in the Sheepshead Bay section of Long Island is drained by the new 126-inch storm sewer recently completed for the Bureau of Sewers of the Borough of Brooklyn. It culminates in a storm water outlet at the head of Sheepshead Bay, consisting of a 126-inch and 102-inch twin sewer, rectangular in shape with overall dimensions of 27 feet x 10 feet 11 inches and containing two barrels with sloping lined inverts, one barrel being 14 feet wide x 7 feet high and the other 9 feet 6 inches wide x 7 feet high. The contract for the construction of the storm sewer was awarded on May 26, 1931, to the Alvon Contracting Corp., Brooklyn, N. Y., at a contract price of $549,998.10. The contract was executed June 9 and work started June 29, 1931. The time allowed for the completion of the work was 375 consecutive working days.

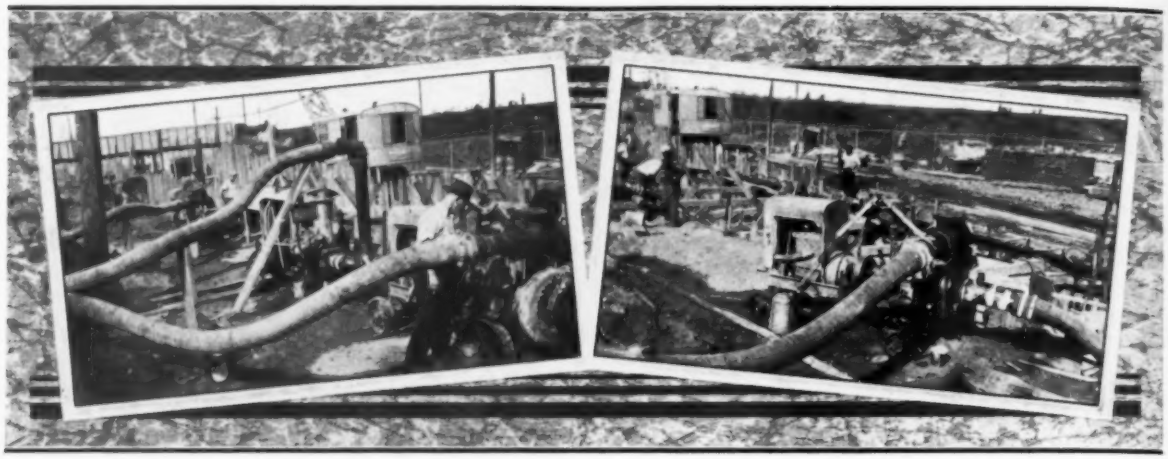
Quantities

126 inch and 102 inch twin storm sewer, 305 linear feet
126 inch storm sewer, 526 linear feet
108 inch storm sewer, 315 linear feet
102 inch storm sewer, 67 linear feet
96 inch storm sewer, 824 linear feet
90 inch storm sewer, 256 linear feet
84 inch storm sewer, 530 linear feet
78 inch storm sewer, 659 linear feet
66 inch storm sewer, 736 linear feet
60 inch storm sewer, 579 linear feet
54 inch storm sewer, 260 linear feet
48 inch storm sewer, 994 linear feet
42 inch storm sewer, 523 linear feet
36 inch storm sewer, 822 linear feet
30 inch storm sewer, 336 linear feet
24 inch pipe storm sewer, 4,333 linear feet
18 inch pipe storm sewer, 133 linear feet
15 inch pipe storm sewer, 396 linear feet
12 inch pipe storm sewer, 7,671 linear feet
48 inch sanitary and 36 inch storm sewers, Type Y, 187 linear feet
48 inch sanitary and 30 inch storm sewers, Type Z, 232 linear feet
48 inch sanitary sewer, 975 linear feet
48 inch cast iron pipe sanitary sewer, 34 linear feet
24 inch pipe sanitary sewer, 510 linear feet
18 inch sanitary sewer, 574 linear feet
15 inch pipe sanitary sewer, 1,074 linear feet
12 inch pipe sanitary sewer, 27 linear feet
10 inch pipe sanitary sewer, 1,357 linear feet
10 inch cast iron pipe sanitary sewer, 48 linear feet
18 inch cast iron force main, 53 linear feet
Outlet, 1.
8 inch sanitary house connection drain, 700 linear feet
6 inch sanitary house connection drain, 1,700 linear feet
8 inch storm house connection drain, 20 linear feet
6 inch storm house connection drain, 10,000 linear feet
Manholes, 222.
Sewer basins, 97
Sewer basins reconnected, 2
Standpipes, 600 linear feet
Oak fenderpiles, 150 linear feet
Sheet piling and wales, 25,000 feet, board measure
Dredging, 400 cubic yards

Handling Section in Wet Ground

The contractor struck a section of wet ground between the tracks of the Brighton Beach Division of the Brooklyn-Manhattan Transit Co. line and the outlet into Sheepshead Bay, a distance of about 1,000 feet. The usual 2 x 12-inch planking was driven by a Union pile hammer hung in a frame from one of the Northwest cranes. Bracing 8 x 8 and 2 x 8 trusses were necessary toward the bottom of the excavation because of the fluidity of the soil. At this point the excavation was 16 feet deep and 21 feet wide within which the 2½-foot outer walls for the twin barrel concrete storm sewer were poured.

During excavation a total of more than 50 standard well points were driven on each side in this section on 3-foot centers and connected up to an 8-inch cast iron header which was pumped with three Lawrence Vortex pumps and one or more other trench pumps. A group of three Northwest cranes with Haiss ½-yard



Close-up of the Battery of Pumps Used on the Well Points and to Dewater the Trench

clamshells were used to handle both the excavation and backfill. The concrete for the twin barrels was mixed in a 21-E paver and chuted to place. The inverts of the twin barrels were lined with American Sewer Pipe Co. vitrified clay liners.

PERSONNEL

This contract was executed by the Alvon Contracting Corp., 2771 Nostrand Ave., Brooklyn, N. Y., and the work was under the personal direction of Vito Picone, President. For the Bureau of Sewers of the Borough of Brooklyn, J. H. Vogt was the Engineer in charge.

Flood Protection for Western Highways

THE character of structure which may be used with success in flood protection is determined partly by the volume of water to be handled and partly by the character of the soil, sand, gravel or other débris transported by the flood. The more common of the destructive floods in the West occur in arid and sandy regions and are usually accompanied by the transportation of considerable quantities of sand. In many cases, this prevents solid structures from being used successfully because of lack of solid foundation, or it makes them useless for the reason that stream beds are filled up and changed There has been considerable use, therefore, of structures of types which are flexible or which may be easily replaced.

Among these is the brush and wire fence constructed of two rows of galvanized iron pipe driven deep in the sand parallel with the stream. Fencing of wire mesh is fixed to the pipe to retain the brush which is placed between the rows of fencing. The brush is weighted down with stone to insure its settling and to fill any washouts which might occur under the fencing.

The California Division of Highways has developed a very definite system of installing this type of fencing. Galvanized iron pipes 2 inches in diameter are spaced 5 feet apart in line and strongly braced with 2-inch pipe both laterally and in line with the fencing which consists of heavy wire mesh. The parallel fencing is usually placed at a distance of 2½ to 5 feet and the intervening space is filled with alternate layers of willow brush and stone. A layer of brush, 2½ feet thick, will compact to a layer 1 foot thick when tamped and loaded with sufficient stone to hold it down.

A variation of the willow and stone filler is the use of stone filled "sausages" of wire mesh, which are laid on top of each other between rows of fencing. Naturally any break in the wire mesh "sausage" casing, however, brings about the destruction of the "sausage."

Another common practice is the construction of mats of wire mesh and cobbles. The bank is first dressed to an even surface on a slope of about 1 on 2, and on it is laid a section of wire mesh with tie-wires at suitable intervals. A coating of cobbles, 4 inches to 8 inches thick, is then laid on the mesh and a second mesh panel is wired down with the tie-wires on top of the cobbles. The mats must be fixed to the top of the slope to prevent their sliding, and this is often done by driving pipes into the slope at 6-foot intervals and wiring the mats in place. It is also necessary that the mats extend over the stream bed sufficiently to blanket any possible areas of scour. This construction gives a flexible mat which, to a certain extent, will follow any undulations which may occur due to washouts. It has been extensively used in storm protection work in Los Angeles County, California, but not to any great extent by the highway organization. The cost is stated as about 25 cents per square foot. The type is effective to withstand intermittent floods that carry boulders in their paths. For a more complete discussion of this interesting topic, our readers are referred to *Proceedings*, American Society of Civil Engineers, Volume 57, Number 9, pages 1322-1331.

Welded Segments Saved Money on Boston Tunnel

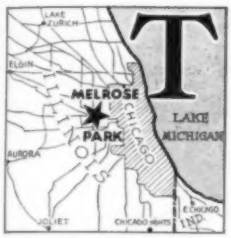
THE 31-foot vehicular tunnel built from Boston under the harbor to East Boston, Mass., and the construction of which was described in some detail in the March issue of CONTRACTORS AND ENGINEERS MONTHLY, has demonstrated very effectively the value and saving in welded segments. A recent report shows a saving of about $1,000,000 over early estimates which contemplated the use of cast segments. The steel liner itself is made up of rings 31 feet in diameter and 2½ feet wide. Each ring contains 11 segments or panels, each panel weighing 1,250 pounds. A total of 12,500 tons of steel are to be used.

The panels were fabricated by The Commercial Shearing & Stamping Co. of Youngstown, Ohio. After stamping to shape, the end plates and rail stiffeners were welded with Lincoln 600-ampere stable arc welders utilizing the shielded arc process. There are 132.72 miles of welding on the 19,467 panels.

After welding, templates were used to locate the 72 bolt holes in each panel, thus making them interchangeable. In placing these panels or segments, the flanges on the adjacent rings are first smeared with putty and then bolted together to make a waterproof connection.

A Notable Grade Separation

Near Chicago



THE junction of Mannheim Road, Route 46, and North Avenue, Route 54, just outside the city limits of Chicago in the village of Melrose Park, has long been one which needed a solution to the constant crossing of heavy traffic. This last summer the plan devised was put into concrete form by the Arcole Construction Co., of Niles Center, Ill. Route 54 was depressed for the regulation viaduct clearance of 14 feet and heavy retaining walls constructed of the counterfort type.

The retaining walls had spread footings from 8 to 24 feet deep and 11 feet wide. The walls were built in 30-foot sections with keys and poured alternately. The walls were 12 inches thick at the top, 18 inches thick at the botttom and well reinforced. The faces of the retaining walls were paneled 1-inch deep making an attractive finish to the structure. Across the depressed highway was a two-span steel truss bridge carrying a 40-foot roadway. The lower roadway is 100 feet wide and capable of handling five lanes of traffic.

The method of handling the work by the contractor was to excavate the trenches for the two retaining walls leaving the earth at natural slope and also leaving the core between the two trenches. The excavation was handled by a Northwest dragline with a 1¼-yard dragline bucket. The dragline operated from the core between the trenches and the mixer for the concrete was also located there, thus getting the maximum of use out of the area before it was excavated. Traffic was detoured around the work.

Concrete Plant and Placing

The aggregates for the concrete were batched at a quarry about 2 miles from the site and hauled in 3-batch trucks to the MultiFoote 27-E paver which handled all the mixing for the job. A fleet of ten trucks was required for the work when the pouring was under way at maximum production. The boom and bucket of the paver were removed and the concrete delivered direct to a Blaw-Knox bottom-dump steel bucket which was handled by the Northwest crane with a 45-foot boom. The cylindrical concrete bucket was dumped into a hopper set inside the forms from which the concrete was delivered to the proper place.

Arcole Construction Company Handled Work in Novel Manner With Minimum Interference to Traffic

The forms were made up of 1 x 6-inch square edged boards dressed on four sides with a 2 x 6-inch studding and double 2 x 6-inch wales. There were twenty-four carpenters employed on the work and a total of seventy men in the organization. For concreting the crew was small, consisting of one man dumping the trucks, a paver operator, one man on the bucket at the paver and two men to spot and dump it on the forms.

To complete the structure the core from the center was taken out by dragline and used for backfill for the ramp roadway that ran around the outside of both the retaining walls to give access to the depressed highway from the upper roadway. The overhead structure was completed with a hand rail and ornamental lighting standards.

Tied into the structure is a sump pit and pump house 32 feet below the grade with two Chicago Pump Co.'s 32-horsepower sewage ejectors mounted 12 feet below grade to care for the drainage into the depressed section of the grade elimination.

Personnel

The project was designed and built under the supervision of the Illinois Division of Highways with L. M. White as Resident Engineer in charge. Construction operations were in charge of Theodore Johnson, superintendent for the Arcole Construction Co.

Contractor Operated Large Pit *for* 10-Mile Road Job

ON its 10-mile concrete paving project running east from Nutterville, a suburb of Wausau, Wis., to Aniwa, the Kramp Construction Co., of Berlin, Wis., used a total of five batching plant set-ups. The first was near the easterly end of the job when 2½ miles were paved running west toward Nutterville when sand and gravel from a commercial pit in Wausau was used. For the remainder of the work a pit in the town of Plover on the Plover River was used, requiring a dead haul of 12 miles for practically the entire time.

The Plover Gravel Pit

A fleet of twenty-one trucks hauling an average of 160 loads of two sizes of stone and one of sand kept the roads between the paving and the pit in a constant whirl of dust. A two-horse road maintainer was kept on the move by the contractor over the roads so that the best possible speeds could be made on the haul, thereby cutting the number of trucks required.

The screening and washing plant required only four men for its operation in producing 700 cubic yards of washed and screened material per ten-hour day. It was necessary to strip about 4 feet of top soil from this pit before operations could be started, which is a much heavier overburden than is usual in this territory. The stripping was done with wheeled scrapers. The next work was the construction of a large settling pond for the wash water. The contractor being a good fisherman wanted to protect the Plover River trout which are particularly fine sport. The continual running of the wash water into the stream would have soon put an end to the trout. Consequently a long earth dike was thrown up around an area of about one acre into which the wash water was run throughout the day. Such water as did seep through the dike was clear and did no harm. Overnight the pond settled and each morning, before the plant was started up, four 6-inch pipes were opened and the clear water drained off into the trout stream. For this may the Isaac Walton League take its hat off to the sportsmanship of another good paving contractor.

Material was pulled in from the gravel pit by a Sauerman scraper and hoist operated by a 65-horsepower Waukesha motor. The sand and gravel were deposited on a bar grizzly over a hopper with an oscillating feed to the 24-inch x 120-foot belt which carried the material up to the 42-inch Garland cylinder screen equipped with rollers to clear the fine stones caught in the holes. The plant itself was operated by a Waukesha 65-horsepower motor and the crusher by another Waukesha motor of 75 horsepower. An Iowa Mfg. Co. 9 x 36-inch crusher reduced the large stone which was carried to the main feed belt and run through the screen again. The stone passing the screens was carried to the two stockpiles by two 18-inch x 40-foot belt conveyors run by two LeRoi 5-horsepower engines. Where the pea gravel dropped to the conveyor an extra ⅜-inch screen was inserted with a stream of water running across it to take out the material that was just too coarse for the sand and too fine for the pea gravel. This odd-size stone was excellent for private driveways and walks and would have found a ready market close to any city. The farmers were invited to remove it as they wanted it and a number took advantage of the offer to improve their roads.

The sand washer was of the screw type which delivered the washed material to a spout to the stockpile. The two sizes of stone and the sand were loaded direct from the stockpiles to the fleet of trucks hauling to the batching plant on the road by a Northwest crane with a 1-yard Blaw-Knox clamshell bucket.

Water for the washing was supplied by a Gould 6-inch centrifugal pump run by a Waukesha 50-horsepower motor and pumped to the plant through a 6-inch pipe.

100,000 Yards of Grading

The rough grading on this job was handled entirely by six Highway Trailer self-loading wheeled scrapers pulled by Caterpillar Sixties and two Caterpillar 12-foot blade graders also handled by the Sixties. Only four or five men were required for hand work on the entire rough grade.

Kramp Construction Company Used Commercial Products Then Opened Pit Requiring a 12-Mile Dead Haul

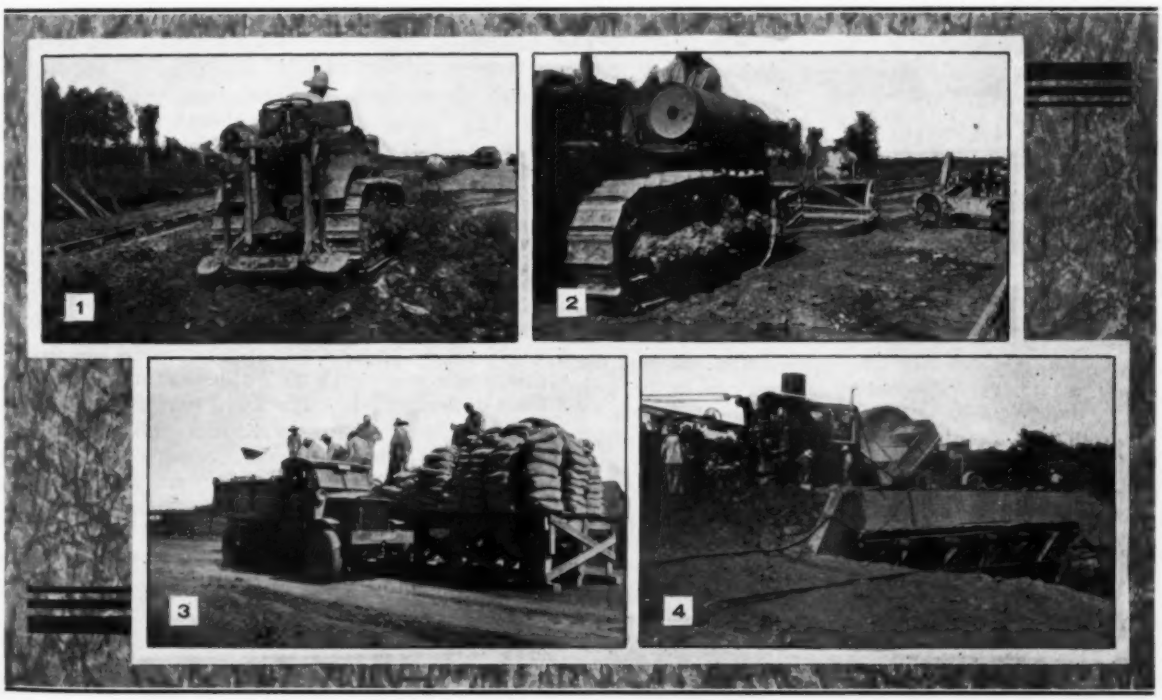
PREPARING THE 9—6½—9-INCH FINE GRADE

The fine grade was prepared by a 1-yard Euclid rotary scraper pulled by a Caterpillar Thirty and a power grader and was rolled by a Wehr gas roller. After the form setters, two on each side, had set the Meta-forms on one side and Lakewood forms on the opposite side from 1,000 to 1,200 feet ahead of the paver, the Caterpillar Thirty pulled a Lakewood subgrader over the forms to cut the section to line. From five to seven hand shovelers trimmed up the grade behind the subgrader. One man cleaned, tamped and oiled the forms. The batch trucks arriving on the grade were turned on a Freeman turntable which was mounted on a slight mound of earth to be sure it always cleared the forms on turning even when the truck was not truly balanced.

MAKING UP THE BATCHES

As mentioned before the batcher plant was set up in five different locations, the first being at the westerly end of the job where commercial material was used. For each of the other locations space was leased in fields alongside the right of way and stockpiles maintained by the hauling fleet from the gravel pit. A Northwest crane with a 45-foot boom and a 1-yard Blaw-Knox clamshell bucket kept the Butler batching plant bins filled for continuous operation. The individual batches consisted of 1,436 pounds of coarse stone, 972 pounds of pea gravel, and 1,297 pounds of sand for the 6-bag batch. The batching plant operating crew consisted of one craneman, one spotter and hand shovel man, and the batcher operator. The batch hauling was handled by a fleet of six to ten two-batch trucks owned and operated by the contractor.

Lehigh portland cement in cloth bags was hauled by truck and trailer from Wausau, a distance of 15 miles, and loaded onto the batches as the trucks stopped at the cement dock or trailers. Five men stacked the bags in piles of six and then took turns in dumping them into the batches as the trucks arrived. One man on the grade shook out the bags as they were tossed down from the trucks and baled them for return to the plant.



FINE GRADE OPERATIONS AND CONCRETING ON THE KRAMP CONSTRUCTION CO. JOB NEAR WAUSAU, WIS.

1. A Thirty tractor with mechanical scarifier knocking down a high spot on the fine grade. 2. Rotary scrapers pulling out excess dirt between the forms ahead of the subgrader. 3. Handling cement in the broiling sun on this unprotected platform was no snap. 4. Handling a paver across a concrete bridge is never easy. Note the falsework left in place beneath this structure so that heavy loads could be handled without damage to the bridge.

One of the Five Set-ups of the Batching Plant

THE HOT WEATHER PROGRAM

Road work must go on in spite of weather unless the grade is too wet to support the trucks and paver. During unusually hot weather the Kramp Construction Co. took particularly good care of its men, giving them a 15-minute rest period out of every hour and a 1½-hour lunch period. In spite of this several of the men were overcome by the scorching heat of the last of June, 1931, and one succumbed. The work was in open country at the time with little or no protection from the sun. During the rest periods the men sought shade anywhere, even crawling under the trucks to drop down and be out of the sun.

POURING THE 18-FOOT SLAB

As this road is merely a connection between Wausau and the town of Aniwa and not a through route the Wisconsin Highway Commission designated it as an 18-foot pavement. The contractor maintained an average of 1,400 feet of slab per day working 10½ hours with a 60-hour week.

Every man on the concrete gang knew his job and even in unusual situations such as the crossing of a bridge with its attendant upsetting of the usual routine and extra shoveling on the grade there was not the rushing around and shouting so common under such conditions. One man spotted and dumped the trucks, cleaning them thoroughly as each batch was dumped into the skip of the Koehring 27-E paver. A Koehring trail grader was pulled by the paver and two men cleaned out the excess earth planed from the grade. There were two steel men on dowels and one placing the wire reinforcing at joints and on approaches to bridges and culverts. Four puddlers kept the concrete spread quickly and uniformly over the grade. An Ord finisher was used, immediately followed by a Cleft-Plane machine with an operator and a helper. A continuous center plane was set by the Cleft-Plane operator. The transverse planes of weakness every 30 feet and the 1-inch expansion joints of Elastite every 90 feet were set by the concrete crew. These were set with a special bulkhead with eccentric clamps to hold the premoulded joint in place while the joint was being set.

Behind the Cleft-Plane machine came the two men with a 12-foot longitudinal float worked from the twin bridges on rollers. These same men also used one belt to remove excess water from the top. One man from a rolling bridge pulled the longitudinal wedges and the transverse wedges from the planes of weakness which extended 2½ inches into the slab. He cleaned the spots preparatory to the pouring of the joints the following day. This was done by two men who used a Littleford tar kettle which was pulled along the slab and heated the tar to the proper consistency. Hand pouring pots were used to fill the joints.

Two men picked up the burlap which had been brought ahead by the same crew that pulled the forms and brought them ahead. This crew consisted of one man and a team and wagon on each side. The same men who spread the burlap on the slab also sprinkled it. Nine men spent all their time covering the slab with earth from the shoulders after the burlap had been removed the morning after pouring. About eight men were required to sprinkle the earth cover.

FURNISHING WATER FOR THE JOB

As there were several streams crossing the right of way there was no difficulty in securing an adequate supply of water with four locations of the two C H & E triplex pumps. Both 2½ and 2-inch pipe was used for the line along the shoulder and both paver and sprinkling connections were made to the same pipe. The pumps, however, were maintained one ahead and one behind the paver to insure sufficient supply at that important point. Taps for the paver hose were placed in the line at 160-foot intervals and the paver carried about 100 feet of hose.

A WAGON CAMP FOR THE MEN

The contractor maintained a well-kept wagon camp for the entire paving crew, although some of the men were local labor and preferred to return to their homes. The sleeping wagons cared for eight men in two tiers and with separate windows for the upper and lower bunks. A sectional mess house also provided room for the kitchen. The office wagon had adequate space for all office work and held two double beds.

PERSONNEL

The 18-foot pavement 10 miles in length described in this article was completed by the Kramp Construction Co., of Berlin, Wis. The large gravel pit operations were in charge of August Kramp, and L. B. Krause was Superintendent in charge of paving. For the Wisconsin Highway Commission the work was done under the direction of C. S. Peterson, Resident Engineer.

Drilling and Blasting

According to Andrew P. Anderson, Highway Engineer, Division of Management, U. S. Bureau of Public Roads, "poor blasting is the rule rather than the exception in much of our highway grading work. This conclusion is based on a study of 71 power shovel grading jobs on which considerable drilling and blasting were necessary." A serial article on this subject by Mr. Anderson will start in the September issue of CONTRACTORS AND ENGINEERS MONTHLY.

Standard Work Shed and Use of Cheap Labor

Features of 344-Foot Bridge

Over Norris Creek, Fayetteville, Tenn.

ONE of the first things that a contractor does when he starts a job is to erect a work shed of some kind that will serve as an office, tool house and protection for other materials. On the Albert Lyons contract for the Norris Creek Bridge at Fayetteville, Tenn., the first thing that the superintendent did was to build a shed the counterpart of which may be seen still in different parts of Tennessee where he has had other jobs. Usually they so impress the farmer on whose land they are erected that he offers to buy them. They have a real utility value. This is the way the shed was built on this job, and others are similar except for the ground dimensions.

The shed had space for the storage of about 1,000 bags of cement and a tool room on the northwest corner, the main feature being the wide roof extended out about 25 feet on the south side. Under this shed the saw rig was located and here in rainy weather the carpenters made up all the forms, thus saving a great deal of time. Later as the form work was completed the shed was used for the hand finishers on the rail spindles who sat at a long bench and rubbed the concrete to a smooth finish. The Parks wood working machine which was located under the shed combined a band saw, a rip saw, a planer, and emery wheel so that it was capable of performing most of the operations that the carpenters required in building the forms. It was operated by an 8-horsepower LeRoi engine and belt.

A Study of the Labor Organization

The skilled labor crew consisted of carpenters, mechanics and foremen of which there was a total of eight besides the Superintendent. The total unskilled labor consisted of fifty-five men hired locally. The unskilled labor was paid 12.5 cents per hour and worked 10 hours for $1.25 per day. With labor at this price the contractor was in a position to give employment to a larger number of men and at the same time save money over the use of equipment in some of his operations.

An outstanding example of this type of saving was in the excavation of deep pits for the foundations or footings of the piers. One particular pit was carried to a depth of 32 feet which would ordinarily have called for a hoist. Instead the contractor handled all the excavated material by hand. The state specifications allow 1½ feet outside the neat line in paying for the excavation. The hole was started 14 feet wide at the top and sheeted up with 2-inch planking of random widths 16 feet long. These were driven down by hand as the excavation progressed. Wales of 4 x 6-inch timber were placed horizontally at 4-foot intervals. As the end of the first set of sheeting was reached a set of 8-inch log wales was placed with a slot behind them for the driving of 3-inch sheeting. This sheeting was carried down through the rock and mud seams. The mud

The Norris Creek Bridge from the Fayetteville or West End, Showing the Position of the Concrete Mixer

ran in, leaving holes in what was to be the rock foundation for some of the centering.

As the excavation was carried down platforms 2½ feet wide were built, staggered at either side of the pit at each 4-foot wale. The platforms were built tight so that sloppy mud and rock would not have a chance to fall or leak through. With two men with scoops to each of the six platforms all of the excavation was lifted to the top at a price that the contractor claimed was cheaper than the use of the hoist that he had on the job and could have used if wanted. He stated that the hoist would have used 15 gallons of gasoline at 20 cents per gallon, and the additional costs of the hoist engineer, equipment repairs, oil and other incidentals would have made the cost fully as much as the use of hand labor for the work. In addition the contractor had the satisfaction of giving work to twice as many men on this particular operation without extra cost to him, and claimed that hand labor proved a real saving. The excavated material was used to backfill the other holes by simply carrying it back in wheelbarrows with almost no extra cost.

J. R. Breeden, Superintendent

Details of the Bridge

The Norris Creek Bridge was built as a concrete structure with a 24-foot roadway and eight 43-foot spans. There were two abutment walls and seven standard Tennessee dumb-bell type piers all carried to rock. One of the abutment walls was a cantilever structure and the other an open type abutment.

As the rock was quite seamy there was considerable water in the holes as they were excavated. The contractor used two C H & E Mud Hen 4-inch diaphragm pumps and a Novo double-diaphragm pump. One of the Mud Hens was set down 12 feet into the hole and used as a force pump with great success. The pumps were run day and night on half load which enabled them just to keep up with the inflow of water.

The third pier from the west abutment was carried 20 feet below ground as planned and poured on what appeared to the State and Federal engineers and to the contractor as good rock. This pier settled 0.3 foot when the first slab was poured. Fortunately this span was the one that rested on rollers so that it was possible to correct the settlement economically. A crib was built of heavy timber, 4 to 5-inch by 14-foot plank for the floor and 2-inch sheeting to hold 75 yards of gravel, making a load of about 115 tons to induce further settlement equivalent to that which would be expected from the dead, live and impact loads on the completed structure. The crib was cantilevered 4 feet over the end of the pier and carried 6 feet back on the slab with posts carrying the load to the pier top. No additional settlement appeared with this load. The initial settlement was compensated for by adding more plates under the rollers of the expansion joint.

The excavation at this pier contained 100 cubic yards of rock. For the fourth pier the excavation was carried 32 feet below ground level, on the fifth 31 feet, the sixth 21 feet and the seventh 11 feet. The footing on the fourth pier was 6 feet 8 inches wide by 30 feet long with 15-inch web walls and circular columns at each end to bridge seat elevation. The footings were 2 feet 4 inches thick.

Falsework or Centering

The individual spans consisted of four girders 18 inches wide and 30 inches deep to the bottom of the 8½-inch slab. To carry the forms for these slabs and girders the contractor poured concrete mud sills, using the sand and gravel that had been mixed with dirt and hence could not be used in the structure. These rough footings for the posts were used for all but two of the spans and supported the timber posts which carried 6 x 8-inch oak caps and 5 x 12-inch oak stringers 14 feet long. Oak wedges were used to take up any settlement in the forms in pouring.

Beneath the two spans where there was settlement of the ground because of the opening of the mud seams, the contractor chose to drive piles to refusal to support the forms. A pile driver with a 1,000-pound gravity hammer and stationary leads and a 2-drum gas hoist was borrowed from a local contractor and his crew of four men hired for two days to drive all the necessary piles.

Building and Handling the Forms

The forms were built under the shed of the tool and storehouse by the carpenters. The forms for the piers were built as nearly as possible in one piece for ease of handling. The side forms were in one piece and were used on all seven piers. The form was laid out carefully on the bench under the shed and then built up and moved as a unit. They measured 14 x 22 feet and were handled cleverly by a crew of unskilled labor, one foreman and a carpenter.

Prior to the placing of the forms a runway was built up of logs and heavy timber extending across the entire length of the bridge. This was heavy enough to permit handling the forms from it and was later used for buggying all the concrete for the structure. The forms were swung from the runway by a 6-part line and a second sideways line. The labor crew consisted of eight men. These forms were built up of ¾-inch dressed lumber 6 inches wide, with tongue and groove. The studs were 2 x 6-inch and the wales 4 x 4-inch. Universal form clamps were used throughout with rods which were removed before finishing.

The Blacksmith Shop and Utility Equipment

This job boasted a blacksmith shop without a blacksmith. The shop had the usual equipment, the total cost of which was in the neighborhood of $100. This included some welding apparatus. With this equipment the foreman who handled all the ordinary and extraordinary blacksmith work had repaired the pumps, sharpened the drill steel, built the tremie pipe for placing the concrete and done sundry other odd jobs, using less than ½-ton of coal and still the original investment in

the shop was practically intact. The superintendent figured that the shop had paid for itself at least five times since its purchase.

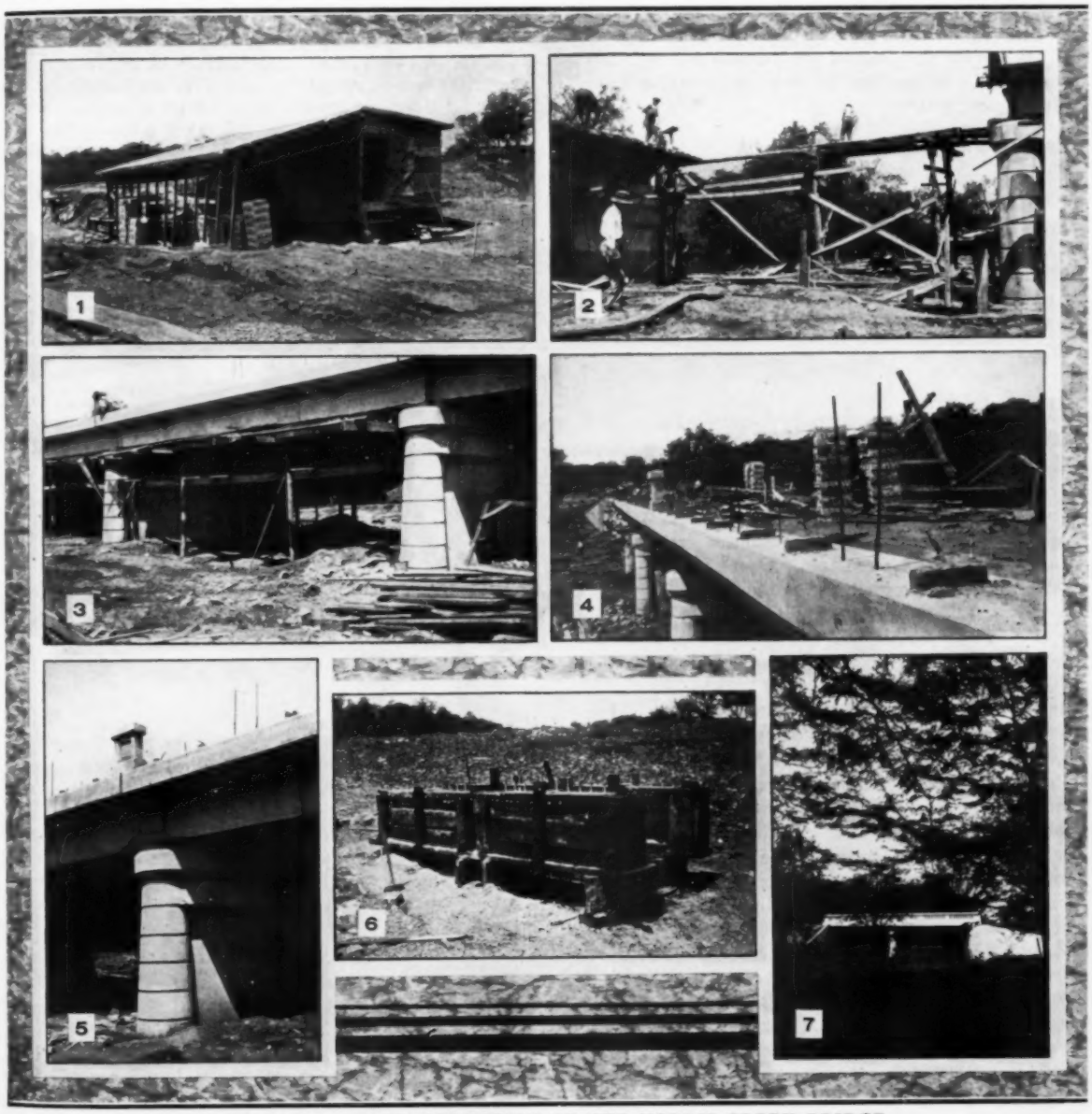
A Gould Pyramid 3 x 5-inch force pump belt-driven by a 2-cylinder LeRoi gas engine was used to provide water through a 1-inch pipe for all purposes around the job.

CONCRETING PLANT AND METHODS

A 2-bag Jaeger mixer was mounted on a 15-foot tower at the west end of the structure at about the final level of the roadway. Home-made skip tracks about 15 feet long were used to permit the skip being loaded at ground level and the skip raised to load the mixer at roadway level. There was little lost time in raising the skip as the 25 seconds required for that operation were part of the time that the previous batch was being mixed and dumped. One man operated the skip and mixer and another man, the water valve.

Two kinds of concrete were used in the structure: Class A, 1:2¼:3¾ for footings and superstructure, and Class S, 1:2:3 for the hand rail. The aggregate was batched in boxes with four men shoveling gravel and two men shoveling sand while four others wheeled the aggregate to the mixer skip. This concreting crew was able to produce 8 yards of concrete an hour with a 1¼-minute mix.

On top the concrete was buggied by two to four



PHASES IN THE CONSTRUCTION OF THE NORRIS CREEK BRIDGE

1. The tool shed with its extended roof. 2. Building the runway for the last span to be poured. 3. Typical falsework. 4. Concrete blocks cast on the curb for lining up the bottom of the hand rail forms. 5. One end of a dumbbell pier showing the web wall, chamfer joint and above, a roller expansion joint and a single pilaster for the hand rail. 6. A group of gang molds for casting spindles. 7. A short span structure completed as part of the same contract as the Norris Creek Bridge and in the same style.

men, depending on the distance of haul, over the runway mentioned before. When pouring the footings the concrete was distributed from a 30-inch square hopper with a 7-inch steel tremie pipe in 3-foot sections which chuted it to the position required. The reinforcing for the structure consisted of ½-inch to 1¼-inch square rods.

After the hand rail posts had been poured the contractor showed great ingenuity in the next operation which permitted easy lining up of the hand rail forms. At about 5-foot intervals along the line of the hand rail, small blocks of concrete 3 x 3 x 11 inches, this latter being the width of the hand rail, were poured on the curb and lined up with the hand rail posts at each end of the span. When the rail forms were set in place and pulled together against the ends of these concrete struts, a straight line on the bottom rail was insured without the difficulties involved with string lining in such close quarters.

MAKING THE SPINDLES

The standard Tennessee hand rail spindles were cast in gang molds ten at a time, using four molds so that the day's production was forty spindles. These gang molds were made from the standard ¼-inch plate spacers which fitted into the grooves in the side plates. Thus it was possible to pour the ten in one mold with the spindles on end and a slight tapping of the mold insured a complete absence of honeycomb. A single reinforcing rod through the center of the spindle facilitated the handling of the unit and tied it into the hand rail. The gang molds were made by countersinking the heads of stove bolts in the plates and carrying them out through the heavy planks on the outside of the molds.

The spindles were hand rubbed with carborundum bricks at benches under the shed beside the tool house, no matter what the weather. The aggregate used in the spindles had a maximum screen size of ¼ inch. A 3-bag batch run through the mixer made 40 spindles.

INSURING A SMOOTH ROADWAY

It is almost axiomatic that the bridge-builder's floor rides rough. The question has been asked me many times, "Why can't a bridge man make his floors ride as smoothly as we highway contractors are required to have our slab?" The answer is that there is no excuse but apparently the highway departments of most of the states never think to make such requirements. This contractor has taken a step ahead of the herd and takes particular pride in making the bridge floor just as smooth as any concrete pavement anywhere. A special trip was made to a bridge of slightly larger size built the previous year on the road from Fayetteville toward Memphis and the riding qualities of the floor were as perfect as could be asked when riding at 6 or 60. How does he do it? The secret lies in a 45-foot steel screed that is used as a longitudinal float on each span providing a finish which irons out all the bumps. The screed is built up of a 4-inch channel with a bow string top and with sixteen verticals of ⅞-inch rods threaded for adjusting. The truss is 3 feet high at the mid-point.

PERSONNEL

The contractor for this 344-foot concrete bridge at Fayetteville, Tenn., was Albert Lyons of Rogersville, Tenn., for whom J. R. Breeden was Superintendent. For the State Highway Department C. M. Arnold was Resident Engineer.

Talkies Available of U. S. Highways

A SIX REEL motion picture in sound scored to music by the Marine Band Orchestra, and titled, "An International Study of American Roads" has been released by the U. S. Department of Agriculture. The film shows the extent of the highway system of the United States, building highways and highway engineering activities. The selection of various types of road surfaces designed to meet the needs of traffic, the effects of pneumatic and solid tires, weight and speed of vehicles, the use of locally available materials for road building and the service of the highways are portrayed.

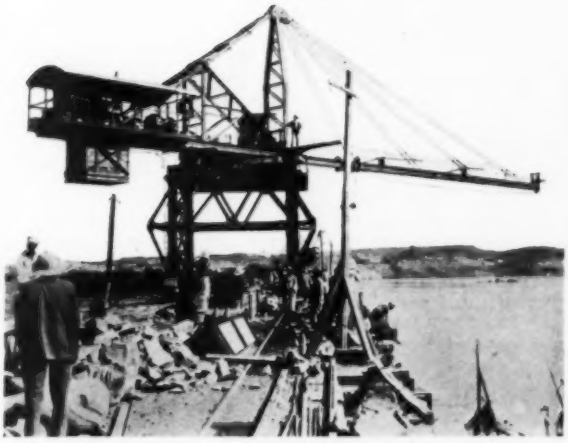
In an introductory speech, Thomas H. MacDonald, Chief of the Bureau of Public Roads, expresses the hope that this motion picture will promote understanding in the road building fraternity in the United States and in the world generally. The titles have been prepared in three foreign languages and it is intended to supply prints to the many countries that sent delegates and representatives to the Sixth International Road Congress, held in Washington, in October, 1930.

This film is primarily intended for road builders and is a standard 35mm sound-on film. It is loaned by the Office of Motion Pictures, U. S. Department of Agriculture, Washington, D. C., to responsible borrowers paying transportation charges.

SAFETY AT THE BATCHER PLANT
Henkel Construction Co., of Mason City, Iowa, had this sign where men might easily be injured, between the batch boxes on the industrial cars and the structural steel supports of the bins.

Assouan Dam Undergoes Second Enlargement

Addition of 29½ Feet to Height of Famous Egyptian Dam Necessary for Storage of Irrigation Water on New Project



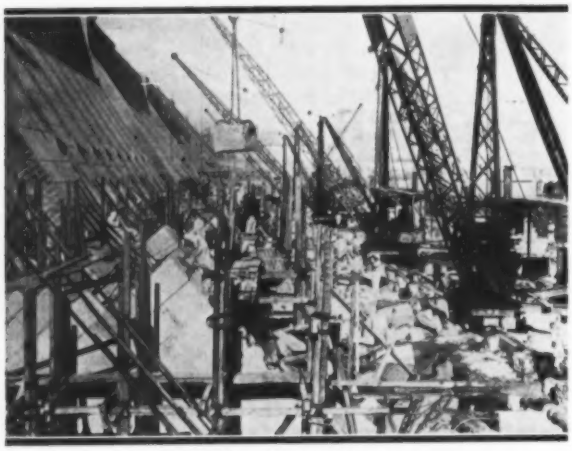
Traveling Crane on Top of the Dam

A DEVELOPMENT which will eclipse in immensity the monuments erected over the space of centuries by Egypt's proud and mighty Pharoahs is now in progress in the gigantic scheme to increase the storage and distribution of the waters of the Nile for the increased and improved irrigation of the soil. The largest unit in the project is the Assouan Dam on the upper Nile, 551 miles south of Cairo. By January 1934, and possibly earlier, the great dam at Assouan which took four years to build at the turn of the Twentieth Century will have been increased in height by 29.5 feet and will provide a total of five billion cubic meters of Nile water for irrigation throughout entire Egypt. This additional storage capacity is double its present storage capacity and five times its original capacity.

Although the original Assouan Dam was increased in height between 1907 and 1912 and many other works for controlling the river were completed during the first part of the Twentieth Century, this construction was not sufficient to meet Egypt's irrigation needs. The object of the Assouan Dam which was the greatest single irrigation project in the history of Egypt was to store one billion cubic meters for the summer requirements of 350,000 acres. The dam was then 128 feet high and a 1¼ miles long and cost $15,000,000 to build. In 1904 it was found necessary to protect the rock downstream of the dam by erecting masonry aprons. This work required two years and cost over $1,500,000. The storage capacity of the dam was increased from one to two and a half billion cubic meters when the dam was increased in height 16.5 feet between 1907 and 1912. This construction involved increasing the thickness of the base of the dam by building a 16.5-foot wide block of stone on its downstream face and increasing its height a similar distance. This work cost $6,100,000.

The Present Construction Project

In November 1928, the Egyptian Government appointed an International Technical Commission composed of Colonel Hugh L. Cooper, an internationally known American engineer, H. E. Gruner of Switzerland and W. J. E. Birnie of England, to examine the plans submitted for the second raising of the height of the Assouan Dam and to submit any proposals of their own in relation to this undertaking. The greatest problem faced by this Commission in designing operations for increasing the height of the dam was to solve the problem of increasing its thickness before adding to its height. The existing dam, originally a monolith, had been thickened during the first increase in its height in



Building the Buttresses

the period 1907-1912 but it was feared that a repetition of this method devised by Sir Benjamin Baker of England would defeat its purpose. Accordingly, an unusual procedure for the work was adopted.

The plan now in execution calls for sliding buttresses leaning on, but not bonded to, the downstream surface of the dam which is built of rough "rock faced" granite which must be smoothed to a mathematically true plane before the new buttresses can be constructed against it. When this has been completed, sheets of stainless steel are to be laid on the smoothed sections and the masonry of the new buttresses built against them. The result will be a series of buttresses leaning heavily against the downstream surface of the dam, assisting it to withstand the increased pressure upon it occasioned by the enlarged reservoir. These buttresses will, however, be entirely free to expand and contract under the varying daily and seasonal temperatures which in this part of the world are known to have a range of 140 degrees Fahrenheit.

The present work includes increasing the height of the dam 29½ feet. This work is being carried out in sections 23 feet long x 23 feet high in alternate 23-foot sections along the existing top of the dam. Four months are permitted to elapse between the construction of any two alternate sections and the intervening sections. An asphalt seal is inserted in the joints between each pair of the sections, and the upstream surface of the joints is caulked with lead wool. Each asphalt seal is provided with pipes so that at any future time the seal may be tightened up with additional asphalt and steam.

Reinforcing the Upstream Face of the Dam

Another feature of the work is the reinforcement of the upstream face of the solid dam by means of hollow stainless steel rods, to resist possible tension on the upper portion of the dam when the reservoir is full. To accomplish this, holes are drilled from the present roadway level through the dam and 6½ feet into its bed rock foundation which is a wide vein of red granite running entirely across the Nile River basin at this point. Corresponding holes will be left in the blocks of stone used to raise the height of the dam and when the job is completed the rods will be grouted in to the rock.

Demolishing Bridge Piers with Dynamite

AN interesting example of the use of explosives in demolition work was the recent destruction of masonry and reinforced concrete bridge piers located midstream of the Delaware River at a point about 2 miles below Trenton, N. J. The group included a pivot pier and two fender piers to support the draw span of a projected steel bridge. The piers were constructed in 1915, but the bridge was never built and the removal of the piers was ordered by the War Department to permit the deepening of the upper Delaware to a depth of 35 feet at mean low water.

The pivot pier was hexagonal in shape and of a total elevation approximately 80 feet from the bottom of the pier foundation below the river bed. Prior to the blast about 30 feet of the masonry was removed, cutting down the pier to an elevation slightly above the normal high tide level. This was accomplished by the use of jack hammers and bench quarrying with explosives. The loading system for the main blast consisted of 19 holes of 5⅝-inch diameter, 42.9 feet long and including a center hole, six holes in a circle of 10-foot radius and twelve staggered holes with an extreme radius of 20 feet.

Seventy-five per cent special gelatin du Pont dynamite was used in the bottom of each hole while the balance was 60 per cent. A charge of 230 pounds was loaded in each of the six holes of the inner circle, while charges of 210 pounds were used in the staggered holes. The center hole was loaded with 260 pounds of explosive and tamped with 8 feet of sand. In loading the holes on the 10-foot radius, 180 pounds of gelatin was tamped with 16 inches of sand, 30 pounds with 3 feet and 20 pounds with 8 feet. The outer or staggered holes contained 150 pounds of gelatin with 4 feet of sand, 30 pounds with 3 feet and 30 pounds with 8 feet of sand. The heaviest loadings were in the bottom of the holes.

The method of firing was a single series connection of all the holes with cordeau, which consists of a lead tube of small diameter filled with an explosive compound and is detonated with blasting caps. Following the demolition of the piers, dredges were put to work, removing the debris.

The contractor for this work was the Dravo Contracting Co., Pittsburgh, Penna., with Samuel R. Russell, of the Explosives Department, E. I. du Pont de Nemours & Co., in charge of the blasting operations.

Ten Safety Commitments

1. To view a liberal safety policy as vital as a limited insurance policy.
2. To meet the public demands for elimination of accident waste for social and economic reasons.
3. To avoid slowing up production due to first attention of all persons in vicinity of accidents.
4. To urge that the "duty first" of every employer is a "safety first" consideration of every employee and his family.
5. To make it as safe for others as we would have them do for us.
6. To realize that a man who feels safe works satisfactorily and that a survivor of an accident is likely to fear another.
7. To remember that a crippled workman is likely to be a handicapped employee, and that one dollar of accident prevention is worth more than one hundred of cure.
8. To note that replacement of an injured employee costs from twenty to one hundred dollars.
9. To adopt safe appliances as sure assets and safe practices for safe profits.
10. To provide safety supervisors jointly with insurance agencies and safety councils.

—By A. P. Greensfelder in a paper presented before the Construction Section, National Safety Council, at the Twentieth Annual Safety Congress.

How the Other Fellow Did It

Construction Briefs

Triangular Lutes or Floats

168. The usual float one sees for concrete finishing is a flat board up to 6 or 8 inches wide and 5 to 8 or even 10 feet long. A Pennsylvania contractor made his own lutes in triangular form with long handles as he found they were more easily handled and gave very good results with less weight than the large flat lutes or floats commonly used. These lutes were made by cutting 4 x 4's about 5 feet long diagonally to give a finishing face about 5½ inches wide. 22.1.64

Cutting Reinforcing Rods With Flame

169. In most large cities many concrete buildings are in the process of being demolished to make room for even larger structures. Breaking up the concrete is done by the usual means of sledging, drilling and wedging. The smallest chunks, however, cling together tenaciously because of the steel reinforcing rods. It is a very simple operation for workmen to cut these rods with the blowpipe, thereby freeing the masses of concrete so that they can be conveniently carted away.

Construction contractors also find that a cutting blowpipe is a useful tool in connection with steel reinforcing rods. In the construction of a tunnel under a railroad in eastern New York the rods for use in reinforcing the concrete were delivered in standard lengths which necessitated cutting them to the specified lengths. To measure, the workmen placed them alongside of the rods to be cut, and it was a simple job to proceed from one rod to the next along a line, using a cutting blowpipe. Each ½ or ¾-inch rod was cut in a few seconds, only a fraction of the time formerly required by some other methods. In addition the oxy-acetylene outfit was handy on the job for repair work and for welding added lengths to rods where necessary. 22.2.68

Buggy Wheels for Burlap

170. A San Bernardino, Calif., contractor has been using a very simple method of handling the burlap which is used to cover concrete during the initial curing period. The burlap is rolled up on a piece of 2-inch pipe and an old concrete buggy wheel is slipped over each end of the pipe. When it is wished to unroll the burlap, the wheels are merely pushed over the shoulder along the paving to be covered. O.L.3.21.32

A Simple Method of Handling Long Rolls of Burlap

A Drill Carrier for Shaft Sinking

171. While shaft sinking in rock is rather well standardized, a contractor on a New York project recently developed a home-made drill carrier for the assembly of all of the shaft drilling equipment so that it could be moved in and out of the shaft with the utmost dispatch. The frame, in addition to serving as a rack for the machines, carried the air and water manifolds with connections to the drills already made up. Two main connections at the top brought the air and water to the manifold. On being lowered into position only these two main connections were necessary before starting work. Eight to ten drills were used on this particular job and by carrying them on such a rack the whole outfit could be moved out of the way for blasting and mucking in a minimum of time. 22.3.53

Home Made Tools for Cutting the Final Grade

172. A North Carolina contractor who was fortunate enough to own a 16 x 16-inch timber 18 feet long used it as the basis of a subgrader to cut the ground to within ¾-inch of the final grade. Flat cutting blades were bolted to the timber and steel shoes were installed on the end so that the beam would run more easily along the steel forms. The whole affair, which weighed about 2 tons when there were 6 men riding it, was mounted on a pair of large diameter wheels with an eccentric axis so that it could be easily moved to and from the forms. When in action, the beam was pulled by a 60-horsepower tractor and in 30 minutes at the end of the day when the last batch truck had left, about 1,500 feet of subgrade was planed and ready for work the next morning. When earth accumulated too deep in front of the blade, the whole beam was lifted on its wheels and scrapers put in between the forms to remove the earth. The cables for pulling the scrapers were 40 feet long so they could be slacked off and the scrapers run in without a lot of maneuvering on the part of the tractor. The whole outfit cost $30 originally and has been in service for a number of years. 21.5.72

A Calcium Chloride Solution Mixer for Pavers

173. There are several commercial calcium chloride solution machines on the market, but sometimes a contractor enters work in a state where calcium chloride solution is required and he sets to work to build a solution machine of his own. A North Carolina contractor did this. The man who oiled the paver emptied the proper amount of calcium chloride into one of the two mixing tanks mounted on a platform on the opposite side of the paver from the operator. The solid chemical was agitated in the solution tank by paddles operated through bevel gears from a jack shaft run by a belt around the mixer drum. A second pulley on the jack shaft ran the pump, which pumped a constant stream of the solution from the tanks to a small measuring tank above the mixer drum. A vent in the top of the measuring tank permitted it to fill completely and then overflow through a pipe back into the mixing tanks. When the skip went up it threw a valve which emptied the measuring tank into the mixer drum and by-passed the flow from the pump to the overflow line. A spring reversed the valve and restored the flow to the measuring tank as soon as the skip went down for another batch. 22.6.52

A Well-Planned Bulk Cement Dock

Woodrich Construction Company Handled Cement Quickly and Without Spilling on Its 11.05-Mile Project

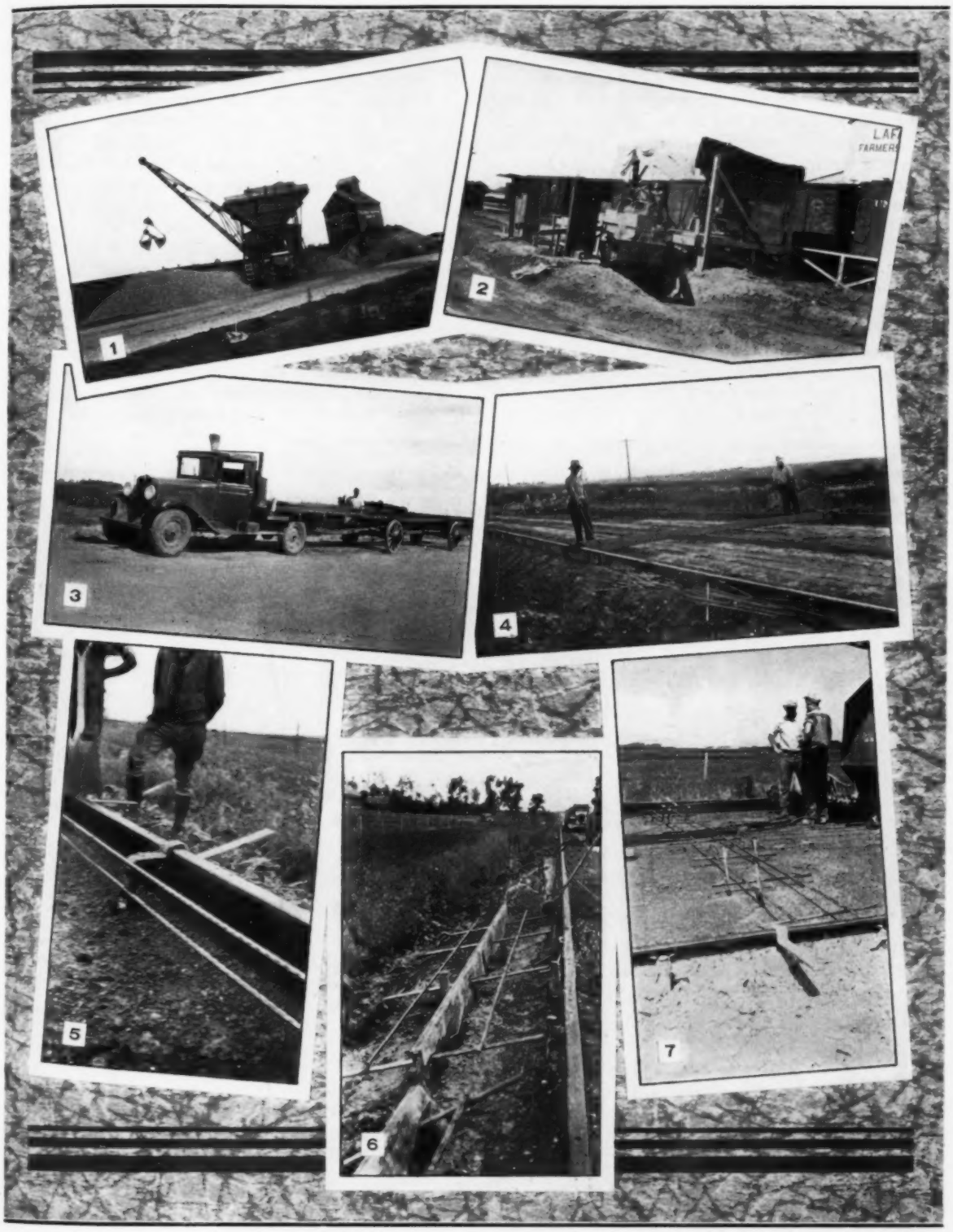
SO many of the "home-made" cement handling docks that have been devised by various contractors are so apparently make-shifts and spill cement, are awkward to manage, and lack facilities to insure accuracy that it is a pleasure to describe one that has many features of note. On an 11.05-mile paving job between Lafayette and New Ulm, Minn., last summer the superintendent and the resident engineer worked out a cement dock different from any others that it has been our privilege to visit. First, however, let us inspect the batching plant where another novelty in protective devices was installed.

Sand and gravel were received by rail in gondola cars from the pit of J. Wunders at Minneapolis, Minn., and unloaded on a siding at Lafayette by a P & H crane with a 45-foot boom and an Erie 1½-yard bucket. Johnson batchers were installed beneath a wooden bin which was equipped with grizzlies for both the sand and gravel compartments. This eliminated the ever present collection of rags and sticks that are picked up from the cars by the bucket. The grizzlies were made up of ⅜ x 2-inch steel plates which ran down diagonally from the top of the compartment to the low side with ½-inch rods spaced 3 inches apart for the sand and 5 inches apart for the gravel. The steel plates were spaced similarly and were held apart by pipe spacers. A visit by one of the pair of men in the gondola cars at the end of every carload was all that was necessary to remove the gathering of rags and sticks from the low ends.

The two-batch trucks backed under the bin on steel plates to keep the trucks at a constant elevation and to prevent cutting of the grade under the bins. It also made it easy to shovel any aggregates that might be spilled by the bucket or batchers without the danger of digging down and producing a condition that would eventually mire the trucks.

The Cement Dock

From the batching plant the trucks drove a distance of 500 feet to the cement dock on the same siding. They approached the dock on a set of steel plates set 90 inches below the level of the cement dock and with a gradual grade on the drive-away side so that the trucks would be nearly level as they stopped at the dock. The platform was 84 feet long, sufficient to accommodate two box cars, and was built substantially at an elevation 40 inches above the rails of the siding. The dock was about 15 feet wide, forming a long runway from the doors of the two box cars to the central section which was widened to 30 feet. In the wide central section was



METHODS OF HANDLING, BATCHING AND REINFORCING BY THE WOODRICH CONSTRUCTION CO., NEW ULM, MINN.

1. The aggregates were handled direct from gondola cars to the batcher immediately adjacent to the road. 2. Delivering two batches of bulk cement to a batch truck. 3. A truck and trailer hauled out the long side bars and spotted them on the shoulder ahead of form setting. 4. Checking the fine grade with a scratch board. 5. The type of removable bar supports used for the side reinforcing rods. 6. Two sections of expansion joint made up on the shoulder ready for placing. 7. Typical reinforcing for a dummy joint in place.

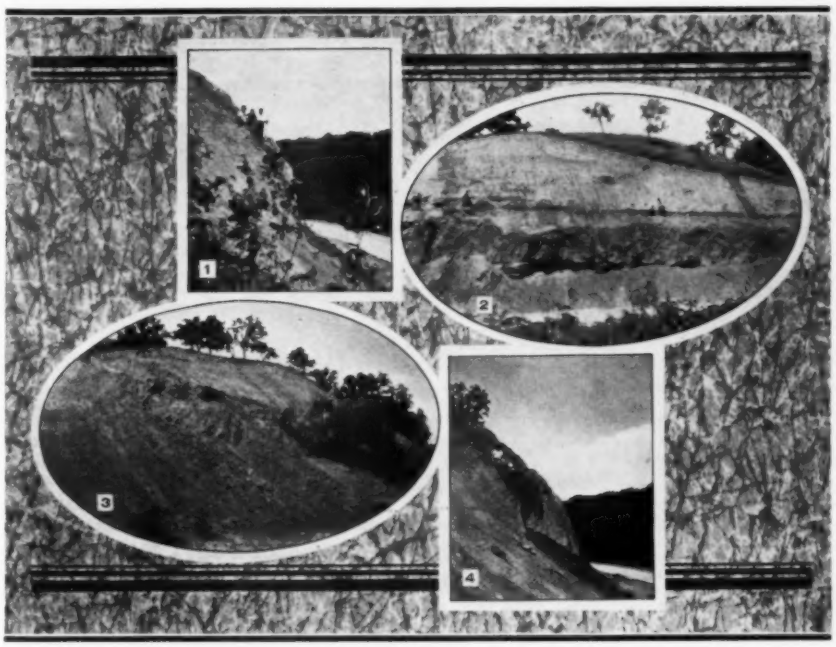
located the weighing platform with the beams of the scale completely covered and protected from the wind and dampness except at the elevation of the beam. That section was open only on the side toward the platform. A frame built over the weighing dock and supported both at the sides and by a center post carried a substantial roof to keep off sun, sudden rain storms and provided a means for the hanging of burlap awnings to reduce the force of the wind on breezy days.

Two separate traps were used for the batches, hinged at the platform and resting on the sides of the trucks on the far end. These traps were built of thin sheet steel and were three-sided, the open side being toward the platform. The traps were counterbalanced with wooden boxes loaded with sand. The ropes ran through the platform so that they were easily accessible to the men raising and lowering them without having to reach far out over the edge of the platform. A bell at the end was used as a signal to the trucks that the batches were loaded, thus eliminating a great amount of shouting and ranting. The inspector used a slotted stick to pass down to the truck drivers the tickets showing that they were carrying out two batches to the paver. As the contractor used both hired and his own trucks this method of checking was necessary. The inspector kept a detailed account of the cement, including the number of the car and its weight of cement as shown on the bill of lading, the number and weights of the batches taken out each working day with a balance plus or minus to check with the billed weight. It was interesting to note that about three to one the weight of the car was billed less than the amount of cement weighed out at the cement dock. This is accounted for by the fact that the cement was weighed in smaller quantities with more accurate scales at the dock than the large car scales where the car was loaded.

The crew operating the cement dock consisted of three men for each car with two shoveling and one wheeling, weighing and dumping. The men changed about every third buggy of cement so that they were

A FEW INTERESTING DETAILS

1. *Oiling the cap on an expansion joint by means of an insecticide sprayer.* 2. *Making lip curb, showing the steel forms and wood spacers.* 3. *The double-flanged wheel trailed behind the finishing machine to cut the slot for the dummy center joint.* 4. *Close-up of the wheel.*



TRIMMING THE CEMENT SAND CLIFF

1. Precarious footing at the top of the ledge where explosives were planted. 2. Work completed about half-way down from the top. Note the steps cut into the soft rock. 3. One of the blasts. 4. Results of a light shot.

brought out with regularity into the clear air from the dust-laden air of the car. The sheet iron traps were hung with canvas which fitted very closely into the body of the truck and there was a remarkably small amount of dust when the batches were dumped. The cement was not covered for the haul to the paver except on windy days.

The scales on the loading dock were at one side of the center post supporting the roof so that the buggies were brought out loaded on one side, weighed, taken to the traps, dumped and then wheeled back on the other side without any interference. For smoothness of operation this dock compared favorably with commercial bulk cement plants which operate with fewer men.

The batches as hauled to the paver were weighed out with 2,225 pounds of gravel, 1,565 pounds of sand and 659 pounds of cement. The cement is furnished by the state for all Minnesota paving projects.

Make-Ready on the Fine Grade

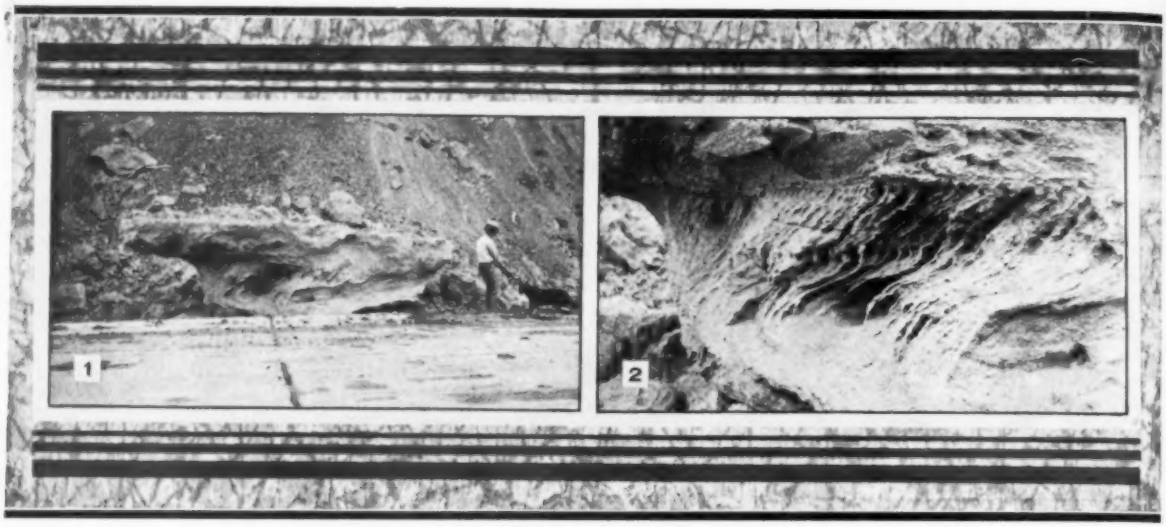
A full complement of machines assisted by the usual operators and about ten hand laborers completed the fine grade and left a minimum of work for the tail graders. A Caterpillar Super Special grader with a 10-foot blade roughly cut the trench for the forms after which part of the fine grade crew trimmed the trench to line and grade with hand shovels, checking it with the notches on the handles of their shovels. There were two form setters on each side who rapidly set the Blaw-Knox 9-inch forms about 700 feet ahead of the paver. High spots in the grade and any regrading necessary because of a change in grade since the original grading contract was completed were taken care of by a Caterpillar Thirty with a Lakewood graderooter. A Killefer rotary scraper took out the surplus dirt. When this was particularly heavy one of the teams that brought up the forms was used with a slip scraper or fresno to move the dirt.

After the grade was in fair condition between the forms the Thirty pulled a Lakewood subgrader along the forms and then the crew of six fine grade men shoveled out by hand. These men also cut the form trench, tamped the forms ahead of the paver, and oiled the forms. Located back of the fine grade work was a Freeman double-ended turntable for the batch trucks. When the Lakewood subgrader was to be pulled along a stretch of 100 or more feet of forms, which was the usual length of haul, the fine grade foreman made certain that there were at least two batch trucks at the paver, then the haul was made and any trucks that might be in the way were required to back until the subgrader had completed the section.

Smooth Teamwork Around the Paver

There was no shouting and rushing around at the paver even when the paver hose was moved as there were two hose. One could be shifted without cutting the supply to the paver and consequently no rousing shouts and the customary parade with the hose were necessary. There was a strong armed man to spot the trucks and see that all of the batch was dumped by a powerful wallop on the bottom of the truck as each batch slid into the skip of the Rex 27-E paver. A home-made grade planer was pulled by the paver and the small amount of earth that was picked up from the well-rolled grade was shoveled out by two tail graders. A 5-ton Huber gas roller was used for the compacting of the grade ahead of the paver and its work was done thoroughly as there was little cutting of the grade by the trucks or the paver itself. The tail graders also took turns sprinkling the grade to lay dust.

Three steel men took care of the multifarious details of handling the making up of the contraction joint dowels and bars, the 1-inch Elastite premoulded joints with caps and dowels, and the placing of the center and side bars with their chairs, ties and spacers. Removable chairs were used beneath the center bars and were made of wood blocks with 3-foot handles or rods so that they could be pulled out from the concrete as soon as the bars were supported by the mass poured around them. Re-



EROSION OF A BLOCK OF CEMENT SAND

1. *A large block which fell from the top of the ledge.* 2. *Close-up showing wind carving in the block of cement sand.*

movable chairs were also used at the sides and had two hooks to hold the bars at the proper elevations and spaced 6 inches from the forms. These were moved ahead as the concrete supported the bars.

There were two puddlers to handle all the shoveling and spreading and a man to spade against the forms on both sides to prevent honeycomb. The Lakewood finishing machine with two screeds pulled a four-wheel trailer which carried a double-flanged wheel to cut the center slot so that the T plate could be placed readily and without pounding. The cut for the T plate was made on the second pass of the machine in finishing. The two men with the longitudinal float worked from a twin roller bridge and after running the float twice over the slab cut and placed the contraction joints, placed the continuous center dummy joint plates and floated over them.

FINISHING THE SLAB AND CURB

The two hand finishers used rigid handled straight-edges to put a final finish on the surface. After the slab was smooth according to the straight-edge the finishers used the first or wet belt and edged the sides of the slab where there was no lip curb. When setting the 2-inch lip curb three men were used on each side, one man on the wheelbarrow usually assisted by one of the finishers in pulling it forward by a hook attached to the front, a man setting the forms which were placed on the slab forms and held tight against them by wedge locks, and a third man who did the finishing. On the 4-inch lip curb an extra man and wheelbarrow were used to bring up concrete. On this job, in addition to the steel form on the outside, a wood form was used to mark the inner limit of the curb which was 12 inches from the side. This was removed as the curb concrete was being finished and then the slight ridge at the wood form was worked out by the finisher.

One man working from a rolling bridge removed the expansion joint caps and the contraction joint wedges and edged the joints. Another man working independently from another bridge removed the continuous T plates from the center joint and handed them out to a helper who cleaned them and carried them forward to the trailer. The method of removing these center plates was unique and resulted from the manner in which the slab was cut by the double-flanged wheel. The T plates were set so well that all that was necessary in removing them was to run a small trowel down either side of the plate and then lift it with a hook. This left a clean T slot that needed no edging. The man pulling the center joint plates also ran the second or dry belt with one of the burlap men while the other was busy sprinkling the burlap.

Two men banked the sides of the slab with earth for the cure of the edges while the main slab was cured with calcium chloride spread over the surface by a man and spreader after the joints had been poured. The tar for the joints was spotted along the shoulder well in advance of the preparation of the grade as were the paper bags of Dowflake calcium chloride. One man with an Aeroil tar kettle poured the joints, using a hand pouring pot. The tar kettle was pulled over the slab which was protected from any possible damage from the heat of the burner by a sheet iron shelf or baffle hung below the kettle.

The forms were pulled and carried forward by two men and two teams with drivers, who alternated on the forms and working on the fine grade with the fresno. The pouring of the joints was done by one man with a helper who also handled the rolling of the burlap and placing it in the wagons to be hauled forward. He also spread the chloride.

In the make-up of the expansion joint assembly the standard cap was first oiled and then turned upside down, the premoulded joint slipped into the cap and then the whole reversed and held in an upright position by a standard made of strap iron. A wooden triangle was used to insure the setting of the expansion joint at right angles to the center line of the slab.

THERE WAS WATER EVERYWHERE IT WAS NEEDED

The water supply for the paver, and no water was needed for other purposes except sprinkling the grade at the paver and 24 hours of wet burlap as calcium chlor-

ide was used for curing, was furnished by a Barnes Quadruplex road pump and a Jaeger Triplex as a booster for one long lift. The pipe was laid along the shoulder well away from the paver to insure its safety. The pipe was 2½-inch for the entire length of the work. The pumps were set ahead of the paver as much as possible and the pipe was taken up by the form pullers and hauled ahead. Thus there was not a lot of pipe strung along the right of way, doing nobody any good. Taps were inserted in the line every 300 feet with a union every 1,000 feet. The paver carried two 175-foot hose and 45 feet of ¾-inch hose for sprinkling the grade.

SUPPLYING THE GASOLINE

The problem of supplying gasoline to equipment strung out along 11 miles of road is one that a contractor is very willing to hand over to a company equipped to carry the gas out regularly instead of tying up one of the contractor's trucks for that work. A local independent gas and oil company carried the gasoline to the machines with a small tank truck, making two complete round trips a day. The operator of each machine signed for the gasoline used and also was required to make an entry in a book he carried as to the amount of gasoline and oil used each day. These books were checked at regular intervals to be sure that the machines were running economically.

AN UNUSUAL PROBLEM

The last work on any paving job is the shouldering. This was done quickly and economically with a Moritz shoulder machine pulled by a Thirty tractor. Instead of the usual large gang of men strung out over a long section of grade and hard to keep track of, the contractor concentrated his attention on the machine and long stretches of shoulder were completed each day.

At the New Ulm end of the road was a most unusual bluff of cement sand which rose fully 65 feet above the roadway. The slope of the bluff was very steep but it stood naturally at a steep angle. Suddenly a large piece of the bluff gave way and slid down to the road. The rock, if it may be called such, is easily scored with the wind and the rain softens it materially. Because of the danger of a major slide at the point where the speed of traffic is bound to be high the state put a number of men on force account under the direction of the contractor to cut back the bluff to a safer slope.

Cow paths trails were cut in the face of the bluff by the workmen and from these they used augers to bore into the soft rock and blew out sections with Hercules 40 per cent dynamite. The cement sand rock was well protected originally by a heavy overburden of impervious clay which prevented the water reaching it and disintegrating it.

PERSONNEL

The organization described was responsible for the pouring of an average of 1,200 to 1,250 feet of 20-foot width 9-7-9-inch section slab in a 10½-hour day. The work was completed on time by the Woodrich Construction Co. of Minneapolis, Minn., with Theodore Bergh as Superintendent. G. M. Christilaw was Resident Engineer for the State Highway Department.

Emergency Federal Aid Appropriation

THE emergency highway appropriation of $120,000,000 for use on Federal Aid projects as contained in "The Emergency Relief and Construction Act for 1932" approved by Congress just prior to adjournment will be distributed to the states in accordance with regular Federal-Aid requirements on the basis of three factors: Population, Area and Mileage of Post Roads. The approximate amount of money which will be available to each state is as follows:

Alabama	$2,550,053	Nevada	$1,578,025
Arizona	1,762,636	New Hampshire	600,000
Arkansas	2,091,431	New Jersey	1,659,121
California	4,669,711	New Mexico	1,962,340
Colorado	2,255,281	New York	6,057,965
Connecticut	779,324	North Carolina	2,890,203
Delaware	600,000	North Dakota	1,940,325
Florida	1,629,204	Ohio	4,501,069
Georgia	3,120,191	Oklahoma	2,893,101
Idaho	1,508,485	Oregon	1,996,128
Illinois	5,077,245	Pennsylvania	5,261,052
Indiana	3,060,266	Rhode Island	600,000
Iowa	3,173,493	South Carolina	1,666,492
Kansas	3,276,334	South Dakota	2,002,076
Kentucky	2,259,648	Tennessee	2,609,757
Louisiana	1,740,196	Texas	7,668,024
Maine	1,070,600	Utah	1,387,190
Maryland	1,015,296	Vermont	600,000
Massachusetts	1,712,774	Virginia	2,258,196
Michigan	3,783,179	Washington	1,905,627
Minnesota	3,373,560	West Virginia	1,316,720
Mississippi	2,160,628	Wisconsin	2,992,438
Missouri	3,761,014	Wyoming	1,540,811
Montana	2,525,108	Hawaii	600,000
Nebraska	2,557,683		

As a result of the enactment of the relief bill, federal participation in highway building is maintained on a par with 1931, according to the American Road Builders Assn.

Where Theory and Practice Meet

THE feasibility and efficiency of proportioning concrete by weight has been strikingly shown in the construction of the Koon Dam in Pennsylvania. This concrete structure is 720 feet long, 90 feet high and involved the use of approximately 81,000 barrels of cement. The difference between the records of materials received and cement used was only 0.4 per cent, including the usual waste in transportation. The cement was weighed by a Toledo Aggregate Determination Auto Gage with an electric recording device which gave a complete record of each batch of concrete for future study by engineers. This has never been obtained before on a concrete job as far as known. Although the equipment was in operation 24 hours a day while concrete was being poured and the total weight was close to 360,000,000 pounds, the weighing outfit was in first rate condition at the close of the work.

PROTECTION OR WASTE

A safety valve in the water line to the paver is an absolute necessity to protect the line from damage through water hammer when the paver valve shuts down suddenly. Here the safety valve had stuck and the landscape was well watered all day.

One of the Operators of the Day Crew Welding a Joint by the Shielded Arc Process on the Outside of Pipe on the Hetch Hetchy Aqueduct

Arc-Welded Field Joints in Large Size Pipe

THE application of the electric arc welding process to the joining of sections of large oil and gas transmission lines is not new but the use of the process on pipe over 30 inches in diameter has been very rare. This was due to several reasons: first, that it was felt that a welded joint was not as economical as some other types of joint; and second, there was some doubt as to the strength of a welded connection.

In 1927 the electric arc was used for the first time on a long distance petroleum line and until June, 1930, the bare electrode was quite popular for this type of work. Test coupons in the field pulled around 45,000 pounds per square inch tensile strength and the welding procedure which developed was quite economical. Arc welding became the standard method of making field connections after June, 1930, when the shielded arc process was introduced for the first time. Since then over 4,000 miles of pipe line, ranging from 6 to 26 inches in diameter, have been laid with shielded arc welded connections. Tests show a resulting weld of over 70,000 pounds per square inch tensile strength. Inasmuch as this process is used at higher welding heat, greater speeds may be attained and the cost per joint lowered.

On pipe under 30 inches in diameter the lengths are fused into sections and the sections tied together with bell-hole welds. The majority of the welding is done in a horizontal position as the pipe can be turned under the arc. The time per joint is estimated at less than one minute per inch diameter of pipe, including two welding and scaling operations on the outside of the pipe. The bell-hole welds must be made with the pipe stationary and require somewhat more time. On the 26-inch Kettleman Hills gas pipe line, one hour was set as the maximum time for a bell-hole weld of three beads.

This process has now been adapted for the larger diameter pipe, notably the 56-inch water supply line now being completed on the Hetch Hetchy Aqueduct in the San Joaquin Valley. The pipe used in the San Francisco water supply system is electrically welded with Lincoln automatic arc welding equipment and in the field several sections of the line are fused into a single unit with the shielded arc. On pipe of this size every weld is necessarily a bell-hole weld and the speed possible where the pipe can be rolled is, of course, not an advantage. The welded joint, however, is insurance against leaks in service and is especially adapted to shock loads, contraction, expansion and resistance to corrosion. The joint itself is a double lap weld. Connection is of the bell and spigot type used on the first welded petroleum lines and is welded on both sides with a full 45-degree fillet weld. No undercutting is permitted. The pipe shell varies in thickness from 5/16 to ½ inch. The welding current is supplied by eight gasoline engine-driven portable welding units of the type used on petroleum pipe line welding. These eight units are adequate in keeping up with the pipe stringing crew.

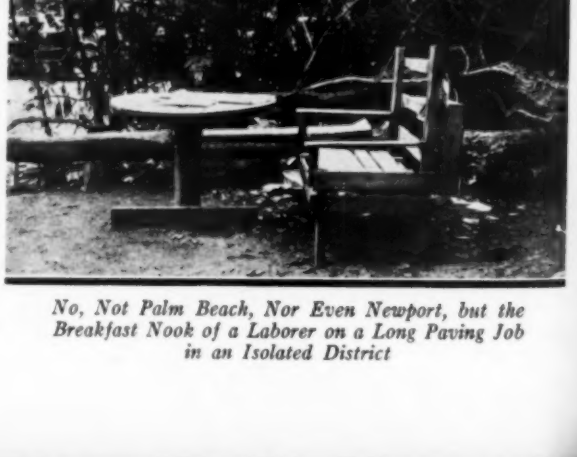
The trench is dug before the lining up of the pipe and the pipe is tack welded in five or six places and rolled into place in sections wherever the terrain permits. The welding is done in two shifts of 8 hours each. The day crew works on the outside of the pipe, and the night crew follows on the inside. In spite of the fact that when the job started only two of the welder operators had ever used the shielded arc process, the speed has been very good. Robert Wilson, welding foreman for the Western Pipe & Steel Co., the welding contractor for the line, has developed a crew of competent operators.

Organized Brains

A POWERFUL organization whose views on industrial problems are frequently solicited by the leaders of government and industry, is conducting a unique campaign. The American Trade Association Executives, of 45 East 17th Street, New York City, is an organized group of several hundred trade association managers who represent many thousands of the progressive concerns in a large lumber of industries. Their job is one of leadership in trade promotion and stabilization, and their constant message to their membership is that only through cooperation can our present problems be solved.

Due to current conditions, a number of exceptional men, through no fault of their own, are available for new connections. They have banded together for the interchange of ideas and opportunities, and have laid out a comprehensive cooperative campaign for telling the business world about it. The entire trade press of the country is being enlisted, while progressive corporations and consulting specialists will be asked to call upon the Placement Committee to fill the need for new viewpoints in the planning of future programs.

This cooperative spirit and collective drive towards a common goal is an object lesson to those industries where cut-throat competition and volume at any price are demoralizing conditions and pushing business deeper into the mire of depression. Only in union are there strength and prosperity and jobs for anxious workers.



No, Not Palm Beach, Nor Even Newport, but the Breakfast Nook of a Laborer on a Long Paving Job in an Isolated District

The Editor Comments—

New Relief Measure Rejuvenates Highway Construction

At last Congress has passed the Emergency Relief and Construction Act for 1932, has happily adjourned, and the President has signed the Bill. Part III of this Act contains the appropriation for Emergency Highway Construction, a total of $156,000,000 divided as follows: $120,000,000 for emergency construction on the Federal Aid system; $5,000,000 for national forest highways; $5,000,000 for the improvement of national forests; $3,000,000 for national park roads; $1,000,000 for Indian reservation roads and $2,000,000 for roads through unappropriated or unreserved public lands. In addition to the definite highway appropriation of $136,000,000 the Act contains an appropriation of $185,274,000 for federal buildings, etc., the expenditures being contingent upon certification of funds by the Secretary of the Treasury.

Highway construction and maintenance has already shown itself as ideal as a form of relief work, both from the standpoint of the worker and on the basis of returns to the public, and such work should prevail wherever appropriate projects can be undertaken promptly and conducted economically to provide a maximum of employment. Just what effect the sums borrowed by the states for highway work will have upon future highway work is a matter of question for the Bill requires that loans to the state "shall be reimbursed to the corporation (Reconstruction Finance Corporation) with interest thereon . . . . by making annual deductions, beginning with the fiscal year 1935, from regular apportionments made from future federal authorizations in aid of the states and territories for the construction of highways and rural post roads, of an amount equal to one-fifth of the share which such state or territory shall be entitled to receive under such apportionment," etc.

The taxpayers of the United States are highway minded because they want satisfactory roads to permit the use of the millions of automobiles which carry pleasure seekers and trade from coast to coast and to every hamlet.

Politicians will have little chance in the future to increase or continue the present diversion of gasoline tax funds from highway work because the demand for highways is bound to increase as soon as the present economic stringency has passed.

Why Bankers Do Not Make Good Contractors

While talking with a very pleasing individual, a levee contractor in Lake Providence, La., the following very interesting commentary on the business acumen of bankers as far as contracting is concerned came to light. This contractor had been quite prosperous in levee work in another state and a group of oil operators who needed levees to protect their fields asked him the cost. He gave a fair estimate and said that he would have to borrow money to finance the extra machine or two that would be required. The oil men, who were also bankers, were willing to loan the money provided they were sold a substantial interest in the contracting organization. This was arranged, a contract awarded for the levees and the new machines put to work.

One of the bankers visited the work, watched the machines swinging rhythmically to and fro, counted the swings per minute and asked how much dirt they handled on each swing. With the answer at hand he did some quick calculating, his eyes opened wider and he enthusiastically turned to the contractor with whom he was now in business and said, "Bill, we must order a dozen more of those machines. They are making money faster than anything I know." The machines cost about $40,000 each, and our dear friend the banker knew nothing of those awful days when wind, weather, mud and breakages prevented the rapid accumulation of money by the erstwhile busy buckets.

Pennsylvania Plans to Bleed the Motorist

The Pennsylvania State Legislature under the guise of appropriating finances for relief work is considering three bills, any of which, if passed, will materially affect highway construction in that otherwise progressive state. Senate Bill No. 4 places all special funds, including gasoline and motor vehicle license revenue, in the general funds of the state. House Bill No. 25 diverts the entire gas tax revenues to counties to be expended by the county practically without restriction and House Bill No. 52 diverts $30,000,000 from the motor funds to welfare work. Highway contractors and motorists are most vitally interested and actively joining with the Associated General Contractors and The American Automobile Association in fighting these iniquitous bills which rob a special class through an easily collected tax in order to secure money for relief measures. It would be far better to go to the limits which Mississippi has used in a state wide sales tax which spreads the contribution of funds over the entire population.

The sad feature of the bills proposed in Pennsylvania is that it will mean an end to highway construction. Pennsylvania has many fine roads which have been praised in these pages, but there are many hundreds of miles yet of main thoroughfares which cannot be rated as first class. It is a sad day when Pennsylvania stoops to diversion of the gas tax from its rightful use.

Theodore Reed Kendall

Construction Industry News

Austin-Western Road Machinery Co., Chicago, Ill., domestic sales organization of the Austin Mfg. Co. and Western Wheeled Scraper Co., has announced that it will handle the industrial sales and service of Cletrac crawler tractors in the territory covered by the mid-western, southern and southeastern states.

Worthington Pump & Machinery Corp., Harrison, N. J., has mounted a demonstration 120-cubic foot Air King portable compressor, rock drills, pavement breakers, clay diggers, trench diggers and backfill tampers on a 2-ton Studebaker truck chassis painted in the characteristic Worthington green. The tools are mounted in a cabinet for display purposes and another set is carried on a tool box for use in demonstrations as this truck tours the country during the summer and fall.

This company has also announced the transfer and consolidation of the designing, engineering and manufacturing activities formerly carried on at its Cincinnati, Ohio, works with those of its Buffalo, N. Y., manufacturing plant. This in no way affects Cincinnati's district sales office which is under the management of Earl Vinnedge.

Pioneer Gravel Equipment Mfg. Co., Minneapolis, Minn., has announced the appointment of W. H. F. Thompson as General Manager of the company and as President of Pioneer Equipment Co., Ltd., Brantford, Ontario.

Keystone Driller Co., Beaver Falls, Pa., has announced the appointment of G. L. Harman as General Sales Manager. Mr. Harman was until recently Manager of Industrial Brownhoist Corp., Cleveland. Lynn H. Ransom has been appointed Chief Engineer of Keystone.

Novo Engine Co., Lansing, Mich., has announced the resignation of Clarence E. Bement as Vice President and General Manager to become Chairman of the Board. He is succeeded by Eric P. Teel, formerly General Superintendent of the company.

Federal Motor Truck Co., Detroit, Mich., through its President, M. L. Pulcher, has announced the appointment of Earl W. Winans as Chief Engineer following the resignation of George B. Ingersoll, who formerly held this position.

Martin H. Kidder, for several years press agent for Link-Belt Co., has recently established his own press service with headquarters at 12238 Normal Ave., Chicago, Ill. One of Mr. Kidder's clients is Harnischfeger Corp., Milwaukee, Wis.

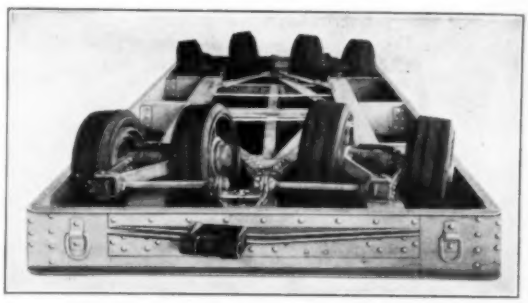
Stephens-Adamson Mfg. Co., Aurora, Ill., has announced a new branch office in the Cutler Building, Rochester, N. Y., with F. H. Wisewell as District Manager.

The Kron Co., Bridgeport, Conn., has announced the following agency appointments for the new Kron automatic scale: Industrial & Commercial Scale Co., 121 North Brevard St., Charlotte, N. C.; J. Kirk Rowell, Urban Bldg., Louisville, Ky.; and Williams, Cole & Wolff, Inc., 315 Commerce Bldg., 744 North Fourth St., Milwaukee, Wis.

A Two-Way Carry-All Trailer

THE La Crosse Tu-Way carry-all trailer for use in hauling contractor's heavy equipment, road building machinery, structural steel sections and other unusually heavy and cumbersome material or equipment, has recently been announced by the C. R. Jahn Co., 1140 First National Bank Bldg., Chicago, Ill. This trailer is fully reversible and less than five minutes are required to change the draw bar from one end to the other. The dual end steering makes it possible to take sharp right angle turns without interfering with traffic and provides a short turning radius. Double end brake control makes it possible to operate the brakes from either end, as the brake control is portable and can be shifted to either end. The brakes are applied on all wheels simultaneously and equally. The brakes may be operated by air or vacuum direct from the motor truck.

The frame is designed to provide equal distribution of the weight over all axles and wheels. The main frame members run the full length of the trailer, and are so spaced that machinery when properly loaded rests directly over the large, wide-flange beams. The short span between the axle centers is designed to eliminate the possibility of sagging frames.



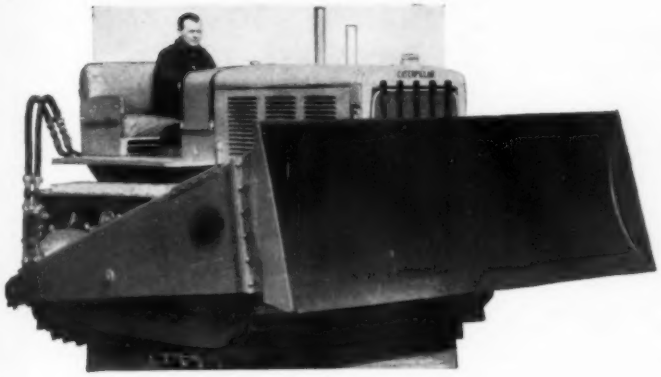
A View of the Wheels of the La Crosse Tu-Way Trailer Making a Right Angle Turn

Steering is accomplished by heavy arms securely bolted to the axle housing and connected by means of a cross steering rod through universal joints which permits pivoting action without affecting positive steering. The steering axles at the opposite end from which the trailer is being pulled are coordinated by means of a longitudinal reach rod with a sliding block connection in the center. This trailer has a capacity of 10 to 40 tons.

A New 2-Ton All-Purpose Truck

A 2-TON truck priced to sell under $1,000 and known as the Federal Model G5 has recently been announced by the Federal Motor Truck Co., Detroit, Mich. This model embodies rugged all-truck construction, a standard chassis weighing 3,800 pounds and carrying a total allowable weight of 11,500 pounds. It is powered with a 6-cylinder L-head type engine, 3⅜-inch bore by 4-inch stroke developing 72 horsepower.

Four-speed transmission, four-wheel hydraulic brakes, Timken bevel type full-floating rear axle, 11-inch heavy duty clutch and a heavy pressed steel frame, auxiliary springs, and disc wheels are but a few of the features of this new truck which is built in 132, 144, 152 and 164-inch wheel base lengths. Other outstanding features are a distinctive type chromium plated radiator, pressed steel channel front bumper and a long hood with straight line cowl and extra large fenders.



The New Blaw-Knox Ateco Bulldozer

A New-Type Hydraulic Bulldozer

THE Blaw-Knox Ateco hydraulic bulldozer, which is manufactured by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Penna., is designed for attachment to all sizes of tractors. The power is hidden in the operating mechanism, being enclosed in the side arms, and fully protected from dust and dirt. The bulldozer bowl is curved, designed to lift and roll dirt. The cutting edge is made of alloy steel and the bowl is electrically welded, heavily reinforced, supported by two side arms and attached to the tractor truck frame.

Another feature of this bulldozer is its compact box-type construction, which allows the blades to work within close limits of the tractor. No part of this frame work extends beyond the rear of the tractor, the drawbar being left free and clear for the attachment of other equipment. The bulldozer is controlled by the tractor operator through the action of the double acting Ateco hydraulic pump, which with a single control holds the bowl with its cutting edge at any desired elevation. A movement of the lever actuated by one man control in one direction raises or lowers the bowl. Only four major parts are involved in this bulldozer, providing for simplicity and ease in installation or demounting. The bulldozer can be used in conjunction with other grading equipment, as the drawbar is free and clear. A by-pass safety valve in the piston allows the bowl to lift if it encounters large boulders or other immovable obstructions.

A New Convertible 7/16-Yard Shovel

A NEW 7/16-yard convertible shovel which, according to the manufacturer, is large enough to handle almost any job requiring a ½-yard shovel and yet has the speed and ease of handling of a ⅜-yard unit, has recently been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. One of the features of this new Buckeye shovel is the patented spring-stop shock absorber which is designed to eliminate swing clutch slippage and shock to relative parts at the moment of reversing. By means of this, with the ring gear free to rotate against spring pressure through a slight angle in either direction, the kinetic energy of the swinging shovel base is overcome with only a fraction of this strain transmitted to the clutch and gears.

A two-speed gear reduction unit provides a choice of two speeds for every operation. An additional two-speed selective gear shaft for the hoist drum makes correct drum speed a matter of choice. The cable drums have a capacity of approximately 200 feet of ⅝-inch cable. The full-length crawler traction units are controlled independently by two reversing clutches and independent brakes and have a ground pressure of less than 10 pounds per square inch on the treads. The machine travels and is easily steered with the rotating base in any direction.

Electric alloy steel is used throughout its simple but rugged construction. Both the traveling and revolving bases are one-piece steel castings. The ring gear is of cast steel, with internal teeth. All spur and bevel gears are machine cut and heat treated. The principal shafts are chrome-nickel steel, heat-treated and ground. All shafts are rigidly supported by bearings mounted on finished cast steel bases. The drive shafts controlling rotation, traction and boom hoist are mounted in Timken roller bearings. Alemite pressure lubrication is used for all bearings. Twin Disc clutches provide accurate control. Adjustment at one point on each clutch assures uniform contact of friction discs. The chain drive from the fulcrum of the boom for the positive type crowd mechanism of the shovel gives definite control of the dipper stick.

Power is supplied by a 4-cylinder 4½-inch x 6¼-inch heavy tractor-type Waukesha motor, developing 50 horsepower at 1,200 r.p.m Its regular equipment includes an electric starter, generator and storage battery. The motor is mounted on a solid cast sub-base as a complete assembly with the radiator, clutch and transmission unit.

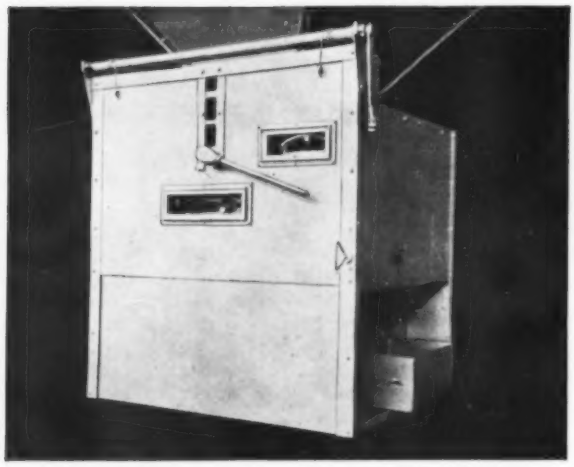
The New Buckeye Shovel

This machine weighs 32,000 pounds rigged as a shovel.

A New Series of Free-Running Explosives

A SERIES of explosives of a radically new type, known as Red Cross Blasting Nos. 2, 3, and 4 F. R., has been developed by the Explosives Department of the E. I. du Pont de Nemours & Co., Wilmington, Del. These so-called free-running powders actually are dynamite of special grades in loose form. They are particularly designed for use in sprung holes and Red Cross No. 2 F. R. is especially adapted for replacing black powder in this work. The manufacturer reports that field experience shows that 60 to 75 pounds of the free running powder will replace 100 pounds of black powder. Nos. 3 and 4 F. R. are well adapted for top loads in certain types of well drill work where they have the advantage over regular cartridge dynamite of completely filling the hole because of their free running characteristics. Red Cross Blasting No. 4 F. R. is of considerable advantage for road work, as many road contractors are using air drills and loading the holes with the stick dynamite, which is a relatively slow process.

While the free running powders do not have any particular water resistance, experience indicates that they may regularly be used where black powder fails because of moisture conditions. The most economical way to detonate free running powders is by means of an electric blasting cap with a primer of at least 40 per cent strength.



The New Butler Electro-Interlocked Cement Weighing Batcher

A New Semi-Automatic Bulk Cement Weighing Hopper

THE importance of eliminating the human element from the control of the amount of cement weighed off in each batch is already recognized by some state highway departments and construction engineers who specify that bulk cement may be used providing it is batched by an approved weighing device. The intent of this specification is to prevent the operator of the weighing batcher carelessly over or underweighing any batch and to insure complete discharge of the cement from the hopper before proceeding with another batch.

The Butler Electro-Interlocked cement weighing batcher, manufactured by the Butler Bin Co., Waukesha, Wis., meets these requirements. The batcher is filled with a hand-operated rotary type gate fastened to the bottom of the bin by which the flow of the cement into the batcher is controlled. When the batch is approximately 100 pounds from the desired weight, the pointer on the tell-tale dial starts to move, and the gate is partially closed, allowing the cement to dribble in until the dial pointer is within the allowable tolerance of 1 per cent or under when the gate is shut. This brings the scale into balance and makes the electric contact with the scale beam so that the batch may be discharged from the weighing hopper by pressing the button. If the batch in the hopper is more than 1 per cent under or overweight, these electric contacts will not permit the operation of the motor on the discharge gate. When the weight has been adjusted and the cement gate closed, the batch of cement is then discharged by pressing the push button located at the front of the scale housing.

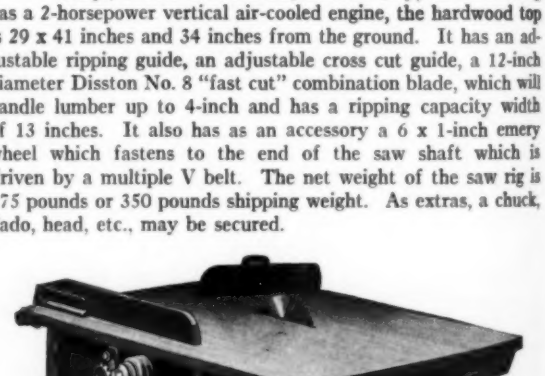
As soon as the discharge gate starts to open, a contact is made which locks the filling gate and also lifts the weighing beam off the scale and at the same time locks the overweight draw-off in closed position and registers the batch on a counting device. When the discharge motor button is pressed, if the filling gate is not completely closed, it will be impossible to start the discharge motor. If for any reason, a small amount of cement is retained in the hopper, by pressing another button on the face of the housing, an electric vibrator attached to the bottom of the batcher is put into operation, insuring complete discharge of the cement. As soon as the cement is out of the hopper and the scale is back in balance with the tell-tale at zero, the electric contact is again made and the discharge gate is closed by pressing the push button. Switches are arranged so that the motor automatically stops when the gate is fully opened and also fully closed. When the discharge gate is closed, a switch automatically makes the contact so that the weighing beam is dropped down into working position on the scale, the filling gate is unlocked, and the outfit is ready for the next batch. The entire weighing mechanism is enclosed in a steel housing. Doors are provided in the front and sides for inspection purposes and these may be locked if desired. The front of the housing is equipped with an opening covered with glass so that the operator can see the pointer on the tell-tale dial and also the graduated scale beam.

A flexible rubber discharge hose is fastened to the bottom of the casing to convey cement from the batcher to the truck or mixer without spillage. This discharge hose is not rigidly fastened to the scale, but a flexible canvas connection between the weighing batcher and the discharge hose prevents any spillage of cement. To prevent dusting when the weighing batcher is being filled, a canvas neck between the filling gate and the hopper is provided. For operating the batcher 110-volt single phase current is used and may be obtained either from a commercial lighting line, or a small electric generator driven by a gasoline engine may be furnished. This will operate not only the weighing batcher and two or three electric lights, but also a 1-horsepower electric motor on an air compressor. While the use of compressed air is not necessary, it is advisable to have compressed air available to insert into the bottom of the cement storage bin to keep the cement in condition so it will flow readily.

The Butler bulk cement bin is designed in such a way that the weighing batcher does not need to be removed from the bin when the plant is shipped from one location to another.

A Saw Rig With Vertical Air Cooled Engine

A SAW rig completely equipped and modern in every detail has been announced by the Sterling Machinery Corp., 2303-7 Holmes St., Kansas City, Mo. The rig has a 2-horsepower vertical air-cooled engine, the hardwood top is 29 x 41 inches and 34 inches from the ground. It has an adjustable ripping guide, an adjustable cross cut guide, a 12-inch diameter Disston No. 8 "fast cut" combination blade, which will handle lumber up to 4-inch and has a ripping capacity width of 13 inches. It also has as an accessory a 6 x 1-inch emery wheel which fastens to the end of the saw shaft which is driven by a multiple V belt. The net weight of the saw rig is 275 pounds or 350 pounds shipping weight. As extras, a chuck, dado, head, etc., may be secured.



The New Sterling Saw Rig

The Littleford Cut-Back Distributor in Action

A Small Distributor for Construction or Maintenance

A MACHINE known as a cut-back distributor which is the result of three years' experimental work and development has been announced by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio. This machine is particularly adaptable for handling penetration work where the area does not exceed 50 square yards or for penetration gutters such as contractors are called upon to construct on many highway projects. It is particularly adaptable for maintenance work in repairing small areas of broken surface, treatments by light or heavy skin patches, for putting non-skid treatments on slippery sections by inverted penetration and for applying paint coats to holes prior to the placement of patching material. Thus the machine has its particular field of service both for contractors and for municipal county and state highway departments.

The cut-back distributor is equipped with rubber tires lending itself to fast and economical portability, as it may be hooked behind even a small 1-ton truck and carried any place the truck can go at truck speed. The power air compressor supplies an even and constant pressure, protected by suitable safety valves that permit the use of the distributor without any delays for hand pumping. The heating arrangement permits the use of heavy asphaltic oils for the semi or full penetration job, in addition to the fact that cold material and emulsions may be used when desired without using the heating equipment.

To prevent the clogging of the distributor hose and spray nozzle, a special blow out attachment is provided so that, after operations have ceased, all material remaining in the hose may be quickly blown out by compressed air at 50 pounds pressure. The capacity of the tank is 70 gallons or approximately enough asphalt or tar may be carried to complete any unit patch of 50 square yards, which is about the average general area patched at one set up.

A New 6-Cylinder 1½-Ton Truck

THE engineering specifications and the mechanical details of a new 1½-ton 6-cylinder Speed Wagon have just been announced by the Reo Motor Car Co., Lansing, Mich. The loading space, 102 inches behind the cab on the 140-inch wheelbase models and 126 inches on the 164-inch model, is unusually large for commercial vehicles of 1½-ton capacity. These trucks are powered with the Gold Crown engine developing 68 brake horsepower at 2,800 rpm. This engine is made with chrome nickel alloy cylinder blocks, an unusually large area for the seven main crankshaft bearings and the piston pins and has a very effective full force feed engine oiling system.

The crankshaft is 2 5/16 inches in diameter. The main bearings are of the close limit, interchangeable type, fitted without shims and providing a total length of 12 inches with a Babbitted surface of 87.12 square inches. The truck has four speed transmission and long flexible springs measuring 40 x 2 inches in front and 50 x 2½ inches in the rear. These Speed Wagons are also built for trailer operation with vacuum brakes.

Portable Troughed Belt Conveyors and Unloaders

A PORTABLE troughed belt conveyor, built in lengths of 20, 25 and 30 feet, and designed for the handling of sand, gravel, crushed stone and similar materials in sand and gravel pits or construction projects, has been announced by the Fairfield Engineering Co., Marion, Ohio.

This Fairfield conveyor is sturdily constructed, light in weight, easily portable and requires very little power to operate. The conveyor belt is 18 inches wide, of high grade rubber, running over Fairfield ball bearing idlers closely spaced and equipped with pressure lubrication fittings. A steel plate receiving hopper at the foot end serves to center the load on the conveyor belt. The receiving hopper plates are equipped with replacable rubber wear strips. The conveyor is equipped with steel skirt plates for its full length which provide a carrying trough 6 inches deep. The return belt is protected from falling materials by a steel plate formed in an inverted V shape and running the full length of the conveyor. An 8-inch diameter lagged head pulley provides efficient traction. A machined worm winch of the self-locking type mounted on the side of the conveyor frame permits the operator to adjust the conveyor discharge height readily at all times.

Power is furnished by a 3-horsepower ball bearing electric motor or a 4½-horsepower air-cooled gasoline engine. The power is transmitted from the motor to the headshaft through steel roller chains and machine sprockets. The main drive chain is fitted with idler sprockets and automatic tension spring take-up.

The unit is mounted on 48-inch carriage wheels mounted on roller bearings to facilitate movement.

Another piece of material handling equipment recently announced by this company is the new Fairfield portable troughed belt feeder designed especially to facilitate the speedy unloading of loose materials such as sand, gravel, or crushed stone. This feeder receives its material as it drops from the hopper, carrying it for further distribution to a portable or stationary conveyor or elevator. The feeder is 18 inches wide and 14 feet long and is powered by either a 3-horsepower electric motor or a 4½-horsepower air-cooled gasoline engine as desired.

The New Fairfield Portable Troughed Belt Conveyor

A New 2-Yard Dragline

OF interest to contractors for the extensive reclamation and flood control projects now under way or being considered is the announcement by the Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis., of the new P & H Model 780 2-yard high speed dragline. This new unit is equipped with a 60-foot boom and 2-yard bucket, weighs 141,000 pounds and has a hoist line speed of 180 feet per minute, a dragline speed of 150 feet per minute and a rotating speed of 3 rpm.

The machine is powered with a 160 to 180-horsepower motor, either gasoline or diesel. Smooth fast performance is assured through the use of power clutches on all controls. A special P & H internal band clutch is used on the jack shaft for added efficiency and reliability. Another feature of the machine is its mobility. The traction mechanism is gear-driven and fully enclosed. In high gear it has a speed of .89 miles per hour while its low gear multiplies its power to overcome the most unfavorable ground conditions. Other features of the machine are single piece alloy steel castings for all main frames to assure rigidity; the upper structure revolving on 26 solid steel rollers operating on a roller path 8 feet 2 inches in diameter; chrome manganese steel shafts, forged and heat-treated, and alloy steel heat-treated gears.

The New P & H Model 780 Dragline

A Line of Heavy-Duty Engines for Industrial Use

THE line of Caterpillar tractor motors has recently been announced by the Caterpillar Tractor Co., Peoria, Ill., as available for stationary and industrial uses. These engines are of the heavy-duty type, and are designed for long life, reliability of service and a minimum of repairs.

The first of this series is the Caterpillar diesel, a 6⅛ x 9¼-inch 4-cylinder engine turning at 700 rpm. This is the result of a number of years of investigation and development work, and its features are simplicity of design and construction and economy of operation. The next in the series is the 4-cylinder 7 x 8½ gasoline engine which powers the Sixty-Five tractor. Other sizes which power the Fifty, Thirty-Five and Twenty-Five, are similar in design, construction and relative performance. The size, speed and power of these engines are as follows:

Engine	Cylinders	Bore	Stroke	RPM	Brake HP
Diesel	4	6⅛	9¼	700	88
Sixty-Five	4	7	8½	650	87
Fifty	4	5½	6½	850	63
Thirty-Five	4	4⅞	6½	850	48
Twenty-Five	4	4	5½	1100	36

The Simplex No. 710 Push and Pull Jack

Push and Pull Jacks

ONE of the handiest accessories which a contractor can have in his tool kit because of its great diversity of uses is a push and pull jack such as the new No. 710 Simplex offered by Templeton, Kenly & Co., 1020 So. Central Ave., Chicago, Ill. This jack, shown above, is used for straightening clamshell and orange peel buckets, plows, forms, graders, hoists, derricks, wheelbarrow frames and for lining up structural steel. It is also used for putting a tension on wire rope and when splicing. It may be used for both removing and replacing crawler shoes on tractors with or without the use of chains and tongs, and it is particularly handy in general overhauling. It may also be used in garages for straightening motor truck frames, fenders, bodies and light axles, for applying and removing spring leaves, for pulling off wheels, aligning universal joints with the transmission and for other repair jobs. The master mechanic on any construction job is a handy man, but the manufacturers state that he will be handier with a Simplex No. 710 jack in his kit.

A New Bulk Cement Scale for Concrete Carts and Wheelbarrows

THE Winslow bulk cement scale for use with concrete carts and wheelbarrows which has recently been announced by the Winslow Government Standard Scale Works, Terre Haute, Ind., is designed to provide a convenient means for weighing cement in bulk. It is a single beam scale graduated to 1,000 pounds capacity with a minimum graduation of one pound. A tare poise is used for balancing the weight of the empty wheelbarrow or cart.

The scale is of all steel construction, with all parts fully protected against dust and moisture and complies with the American Road Builders Association and State Highway Departments specifications. It can be set flush with the platform level or approach runways used and is adaptable to any bulk cement handling system which a contractor may devise for use on small jobs.

The New Winslow Bulk Cement Scale

A Four-Wheel-Drive Tractor

A FOUR-WHEEL-DRIVE tractor, among the features of which are flexibility, balanced traction, short turning radius and narrow width, has recently been announced by the Massey-Harris Co., Racine, Wis. This tractor when equipped with various attachments, may be used for maintenance work, hauling, stump pulling, brush cleaning, road building, dredging, filling-in, ditch cleaning, snow removal and similar jobs.

This 4-wheel drive tractor is powered by a 15-horsepower engine with a 4-inch bore and 4½-inch stroke, with 1,200 rpm. It has three forward speeds, 2¾, 4½ and 9 miles per hour and a reverse speed of 3¼ miles per hour. Lubrication is by the forced feed system by a gear pump and dip pan splash, with an oil filtering device. A high tension magneto with an impulse starter assures easy and quick starting under all weather conditions. The cooling system consists of a centrifugal type water pump, an 18-inch fan mounted on Timken bearings and driven by a V belt. It has a four-wheel drive, with 20-inch steel tires or solid cast wheels equipped with pneumatic or solid rubber tires.

The width of the tractor varies from 59 to 70 inches, depending on the wheel and tire equipment desired. The wheelbase is 52½ inches and the unit weighs from 4,000 to 7,000 pounds.

A Massey-Harris Four-Wheel-Drive Tractor Equipped with a Maintainer

Extra equipment includes lights, starter, bumpers front and rear, a cab and solid cast wheels equipped with pneumatic or solid rubber tires. Special attachments include a crane for mounting on the rear, a sweeper for either the front or rear, a snow plow, a maintainer, a bulldozer, a ditcher or a winch for mounting on the rear which will accommodate 700 feet of ½-inch cable and will exert a 5,000-pound straight line pull.

A New Pipe Boom for Crawler Tractors

A NEW high-capacity pipe boom for the Model GH Trackson McCormick-Deering crawler tractor is now being manufactured by the Highway Trailer Co., Edgerton, Wis. This new unit is a side boom of the live type and in combination with the Model GH tractor, is known as the Trackson-Highway pipe layer. It is compact and rugged, with no protruding parts to snag branches or underbrush, and its size and weight make for easy maneuvering in close quarters. Natural hand-wheel steering and convenient levers permit speedy operation and easy accurate control over any kind of ground.

Without a stiffleg and with the load 2 feet out from the tractor, the lifting capacity is 19,875 pounds. Both the boom winch and lifting winch bave worm and worm gear drive, with

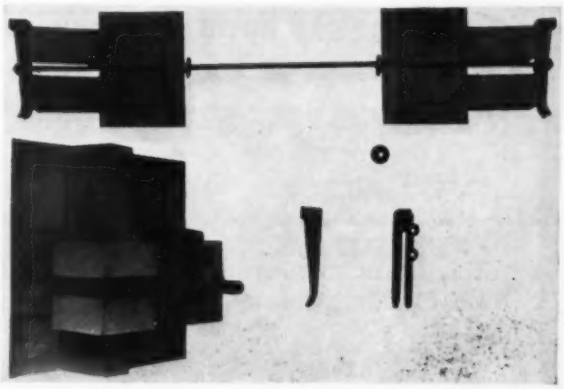
The Trackson-Highway Pipe Layer

a safety feature of lowering under power. The power take-off is of a heavy-duty type especially designed for the Model 20 McCormick-Deering and provides two speeds forward and one reverse. All castings, including the worm gear housings, drums and support hanger, are made of electric steel. The whole boom and frame assembly is hot riveted and electric welded. Bolts are used only where disassembly might be necessary later and the guide sheave and sheave blocks have oilless bronze bushings.

A Compact Clamp for Concrete Forms

THE Colt concrete form clamp and wedge, which is made in one unit, has recently been announced by the Frederick N. Ritchie Co., 113 North Centre St., Orange, N. J. The clamp is made of malleable iron, with cup pointed case hardened set screws and can be applied in 15 seconds, according to the manufacturer, one blow of a hammer clamping and locking the forms. This quick action clamp can be used on ¼, ⅜, ½ and ⅝-inch round rods or with wire.

This firm also manufactures the Midget Wedge and Tie-spreader in sizes up to 24 inches and has a number of practical features, one of which is a round washer on the rod to prevent the concrete seeping out through the rod holes in the forms.



At Top, the Colt Tie-Rod, Spreader and Midget Wedge Holding Forms in Position. Lower Left, the Colt Form Clamp and Wedge.

These especially selected catalogs and pamphlets of value to contractors are for free distribution.

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Asphalt Planking For Bridge Floors

767 Servicised Products Corp., 6051 West 65th St., Chicago, Ill., will be glad to send to those interested complete information in regard to Servicised fibrated asphalt planking for use in bridge floors.

A New Sheepsfoot Roller

768 The Le Tourneau sheepsfoot roller, which is made with an adjustable blade in front of the rollers to level the ground before it is rolled, and which may be had in units of one, two or three rolls is described in literature which R. G. Le Tourneau, Inc., Wilson Way and Roosevelt Ave., Stockton, Calif., will be glad to send on request.

A New Fill Settlement Book

769 A new 80-page book entitled "Accelerating Swamp Fill Settlement with Explosives" containing information and data on all known successful methods of fill settlement by the use of explosives and profusely illustrated with diagrams and photographs, has recently been published by the Hercules Powder Co., 915 King St., Wilmington, Dela., who will be glad to send a copy to interested highway contractors and engineers on request.

All-Steel Hand Hoists

770 Beebe all-steel hand hoists which weigh 110 pounds, have a straight-line capacity of 5 tons with a positive internal brake and two speeds, 4 to 1 and 24 to 1, are described in a circular which Beebe Bros., 2724 Sixth Ave., So., Seattle, Wash., will be glad to send on request.

A New-Type Hydraulic Bulldozer

771 Complete information in regard to the Blaw-Knox Ateco hydraulic bulldozer which is designed for all sizes of tractors, among the features of which are the power hidden in the operating mechanism, the curved bulldozer bowl, the compact box-type construction and the double acting Ateco hydraulic pump which controls the bowl, may be secured by interested contractors from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Penna.

Daytime Conditions on Night Jobs

772 Literature describing the National Carbide V-G light which gives daytime conditions on night jobs, spreads a full even beam of 8,000 candlepower and lights up the job for 12 hours on one 7-pound charge of National 14-ND carbide and 7 gallons of water, may be secured by those interested from the National Carbide Sales Corp., Lincoln Bldg., New York City.

A New 32-Page Tractor Catalog

773 Allis-Chalmers has released an attractive 32-page catalog which describes in detail the new Allis-Chalmers Model L track-type tractor. The general plan of the catalog is to cover one outstanding feature of the tractor on each page by means of a large illustration and brief copy. Copies of the new catalog can be obtained by writing to the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

A New Power-Controlled Grader

774 Caterpillar Tractor Co., Peoria, Ill., has announced a new power controlled Caterpillar Sixty grader in which seven levers control eighteen movements of the various parts of the grader. A single-cylinder air-cooled 5-horsepower engine mounted on the grader furnishes the power for operating the various movements. Details of performance and cost may be secured direct from the manufacturer.

The Service of Ingot Iron Pipe

775 A 52-page illustrated booklet entitled, "Long Service from Armco Ingot Iron Pipe" has recently been issued, giving valuable information regarding spiral welded 8 to 20-inch pipe, straight seam welded 20 to 96-inch pipe, riveted 30 to 96-inch pipe and lock-bar 20 to 72-inch pipe. Copies of this booklet may be secured from the American Rolling Mill Co., Middletown, Ohio.

A Special Side Dump Body

776 Model 36 UB side dump hoist with Type 459 1½-2-cubic yard body which can be used to haul materials and also with the sides removed and tailgate flat used as a flat bed truck is described in detail in Form HB-S14 issued by the St.Paul Hydraulic Hoist Co., St. Paul, Minn.

A New Tubeless Tire

777 Complete information in regard to the new Zero Pressure tire for road building and industrial tractors, a tubeless tire having great tractive ability as well as a cushioning effect, and which no penetrating obstacle can damage because it is not under air pressure, may be secured by those interested from the B. F. Goodrich Co., Akron, Ohio.

A Rigid Steel Road Rail

778 The 16-page illustrated catalog of Metal Forms Corp., Milwaukee, Wis., on Metaform—, The Rigid Road Rail, completely describes the advantages of Metaforms which give faster set-up and quicker take-down and are equipped with an 8-inch base.

A Concrete Highway Grinding Machine

779 The No. 5093-CG Mall concrete highway grinding machine which will grind down all surface irregularities is described in detail and illustrated in Form 31101 issued by the Mall Tool Co., 7740 So. Chicago Ave., Chicago, Ill.

A Self-Contained Portable Bulk Cement Batching Plant

780 The Heltzel Steel Form and Iron Co., Warren, Ohio, will be pleased to send a complete description and illustration of its new portable bulk cement batching plant which is self-contained and which may be equipped with the well-known Heltzel trailer system permitting it to be moved by a motor truck.

Curing Concrete with Silicate of Soda

781 A 64-page technical publication replete with illustrations and the results of tests has been published by the Sodium Silicate Manufacturers Institute, on curing concrete with silicate of soda. Copies of this book at $1.50 each may be secured from J. P. Elkinton, Sodium Silicate Mfrs. Institute, 121 S. Third St., Philadelphia, Pa., or from The Grasselli Chemical Co., Inc., Cleveland, Ohio; Mechling Brothers Chemical Co., Camden, N. J.; The Philadelphia Quartz Co., Philadelphia, Pa.; and The Standard Silicate Co., Cincinnati, Ohio.

A Two-Way Carry-All Trailer

782 The La Crosse Tu-Way carry-all trailer, which has a capacity of 10 to 40 tons and is designed for hauling contractors' heavy equipment, road building machinery, structural steel sections and other unusually heavy and cumbersome material or equipment, is described in literature which may be secured on request from the C. R. Jahn Co., 1140 First National Bank Bldg., Chicago, Ill. Special features of this trailer are its reversibility, dual end steering, flat platform and double end brake control.

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CONTRACTORS AND ENGINEERS MONTHLY
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A Trench Hoe with Real Pick Action

783 The new style in trench hoes set by Bay City with its 3-line 2-lever controlled trench hoe that has real pick action and is built in ⅜ to 1-cubic yard sizes with cutting widths from 15 to 48 inches is described completely in Bulletin 36 which may be secured from Bay City Shovels, Inc., Bay City, Mich.

A Complete Trailer-Mounted Gravel Plant

784 The Pioneer Duplex trailer plant, a new portable unit including jaw and roll crushers, screening plant and power unit all mounted on a 10-inch channel frame able to move along with the shovel in a gravel pit, is completely described and illustrated in Bulletin 125 issued by the Pioneer Gravel Equipment Mfg. Co., 1515 Central Ave., Minneapolis, Minn.

Power Units in Low Horsepower Range

785 Complete information in regard to the new Hercules series of power units in low horsepower range, known as the IX, IXA and IXB, all having the same overall dimensions and hence being interchangeable in connection with any assembly, the only difference in specifications being in the bore of the engines and the parts affected thereby, may be secured by those interested from the Hercules Motors Corp., Canton, Ohio.

A New General Utility Dragline Bucket

786 The new Red Arch dragline bucket Type X for the average run of dragline work built in sizes from ½ to 8 cubic yards full measure and built with a one-piece annealed steel casting providing great strength without excess weight is described in Bulletin DB1 of the Bucyrus-Erie Co., South Milwaukee, Wis.

Bottom-Dump Trailers with Crawler Tracks

787 Bulletins No. 507 and 508 describing bottom-dump trailers in 5, 6, 7 and 8-yard capacities for service with elevating graders, shovels or draglines, a feature of which is the Forged-Trak crawler tracks, may be secured by interested contractors from the Athey Truss Wheel Co., 130 North Wells St., Chicago, Ill.

A New 2-Yard Dragline

788 Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis., will be glad to send to those interested complete information in regard to the new P & H Model-780 2-yard high speed dragline which has a hoist line speed of 180 feet per minute, a dragline speed of 150 feet per minute and a rotating speed of 3 rpm.

A 240-Foot 4-Cylinder Portable Compressor

789 The Curtis 240-foot 4-cylinder portable compressor as well as the 180-foot 4-cylinder model and the 40, 66, 80 and 120-foot 2-cylinder models all of which have carbon free valves and either portable or skid mounting, are described in Bulletin C-6-A which the Curtis Pneumatic Machinery Co., 1671 Kienlin Ave., St. Louis, Mo., will be glad to send on request.

A New Line of Engines

790 Waukesha Motor Co., Waukesha, Wis., will be glad to send to those interested complete information in regard to the new Waukesha full-power engines, the features of which are the Ricardo principle of combustion and the new metals developed for use in its manufacture, and which are now available in three sizes of sixes rated at 90, 110 and 125-horsepower.

A New Truck Mixer and Agitator

791 Details of the new Rex 5-yard Moto-Mixer or 7-yard agitator in which the mixer and agitator units are driven by independent motors equipped with electric starters and the whole available with the Rex-Heil Jackass hoist may be secured from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis.

A New Clamshell Bucket

792 The new Williams Champion clamshell bucket, designed for serviceability, heavy duty and long life, and which is made in a number of capacities to meet the various requirements of contractors for excavating and rehandling work, is described in literature which the Wellman Engineering Co., 7012 Central Ave., Cleveland, Ohio, will be glad to send on request.

A 1½-Yard Mixer for Light-Duty Trucks

793 Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, will be glad to send to interested contractors full information in regard to the new Jaeger high speed truck mixer for mounting on 1932 Ford trucks or other light-duty trucks of similar specifications. This unit serves as a 1½-yard mixer or a 2-yard agitator.

A Full-Revolving Hydraulic Crane

794 Literature describing the new Cletrac full-revolving hydraulic crane, mounted on a Cletrac 35 tractor, a unit which is easily maneuvered, is mobile and has positive traction enabling it to pick up heavy loads and move them quickly where desired, regardless of ground conditions, may be secured by those interested from the Cleveland Tractor Co., 19321 Euclid Ave., Cleveland, Ohio.

An All-Service Centrifugal Pump

795 An all-service centrifugal pump made in capacities from 5 to 800 gpm for heads up to 100 feet and in ¼ to 25-horsepower sizes with open type, totally enclosed or explosion-proof motors has been announced by Ingersoll-Rand Co., 11 Broadway, New York City, in the Cameron Motorpump. This unit is described completely in Form 1917 which may be secured direct from the manufacturer.

A New Model 5-7-Ton Roller

796 In Bulletin AD-1256, the Austin-Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill., describes the latest Austin Cadet roller which is a brand new model patterned more closely than ever after the well-known Austin double-spur gear-drive Autocrat.

Power for Construction Equipment

797 Continental Motors Corp., Detroit, Mich., will be glad to send to those interested complete information on Continental engines which are designed to give the maximum power and satisfactory and dependable service at low costs.

Wheel Scrapers for Dirt Moving Jobs

798 Euclid Road Machinery Co., Cleveland, Ohio, will be glad to send to interested contractors a complete description of Euclid wheel scrapers which are of heavy duty construction, made in sizes for every large tractor, have automatic pan lifting control, the Euclid automatic jack and special digger teeth.

A Three-Unit Bituminous Paver and Finisher

799 The Barber-Greene Co., 485 W. Park Ave., Aurora, Ill., has announced a three-unit bituminous paver and finisher replacing the two-unit machine announced some time ago. It now consists of a special loader, a mixer and a finisher. This is described in detail in literature which may be secured from the manufacturer.

A Self-Unloading Tank Car for Bulk Cement

800 The Dry-Flo self-unloading tank car for bulk cement is described in literature which may be secured from the Link-Belt Co., 910 So. Michigan Ave., Chicago, Ill. This car carries 65 tons of cement, can be unloaded in less than two hours and there is no arching of the cement so common in bins where cement is stored. Saving in packages and labor over sack shipment of cement is estimated at $2.00 per ton.

A New Push and Pull Jack

801 Templeton, Kenly & Co., 1020 So. Central Ave. Chicago, Ill., will be pleased to send copies of its Forms 332 and 323 describing the Simplex No. 710 push and pull jack that will push, pull, lift, lower and clamp.

A Complete Line of Buckets

802 Complete information in regard to Hayward orange peel, clamshell, electric motor and dragline buckets for all types of digging and rehandling work may be secured by interested contractors from the Hayward Co., 32-36 Dey St., New York City.

Dependable and Long Wearing Culverts

803 Gohi Culvert Manufacturers, Inc., Newport, Ky., will be glad to send to those interested complete information in regard to Gohi culverts which are made of pure iron-copper alloy base metal to meet the copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.

A Self-Propelled Full and Narrow-Gage Railroad Compressor

804 Schramm, Inc., West Chester, Pa., will be pleased to send complete information regarding its new self-propelled railroad compressor made in 120, 180, 240 and 360-cubic foot displacement with a clutch to disconnect the compressor when the unit is moving itself along the rails and speeds up to 20 mph either forward or in reverse. The engine is built in both standard gage and industrial gage units.

A New Series of Explosives

805 Complete information in regard to a series of explosives of a radically new type, known as Red Cross Blasting Nos. 2, 3 and 4 F. R., which are designed for use in sprung holes and actually are dynamite of special grades in loose form, may be secured by those interested from E. I. du Pont de Nemours & Co., Explosives Dept., Wilmington, Dela.

A New High-Lift Tractor-Mounted Grader

806 The Fabriform loader, a light high-lift bucket loader mounted on a McCormick-Deering industrial tractor and equipped with a ½-yard bucket with a traveling speed of 68 feet per minute is being sold nationally by the Industrial Equipment Division, Pettibone, Mulliken Co., 4710 West Division St., Chicago, Ill., from which company complete data and prices may be secured.

A Single Force Diaphragm Pump

807 The Novo No. 3 single force diaphragm pump capable of delivering 4,000 gph at a 10-foot static lift and with a guaranteed capacity 10 per cent greater, mounted on a channel iron base with steel wheels and powered with a 2-horsepower 1-cylinder engine is described in a special pump sheet No. 2 which may be secured from the Novo Engine Co., 216 Porter St., Lansing, Mich.

Dry Jobs for Wet Ones

808 Complete information in regard to the Moretrench well point system for predraining wet locations in order to work in the dry, may be secured by interested contractors and engineers from the Moretrench Corp., 90 West St., New York City.

A Lubricant for Construction Equipment

809 D-A Lubricant Co., Inc., Indianapolis, Ind., will be glad to send to interested contractors complete information and prices on the D-A semi-fluid lubricant for tractors, trucks, shovels and all types of heavy-duty construction equipment.

Hoists for Construction Use

810 Lambert and National hoists, made in a variety of sizes, and gasoline, electric or steam operated, to meet the many requirements of the construction industry, are described in literature which McKiernan-Terry Corp., 19 Park Row, New York City, will be glad to send on request.

Dependable Lanterns and Torches

811 R. E. Dietz Co., 60 Laight St., New York City, will be glad to send to interested contractors complete information and prices on the Dietz lanterns and torches which are designed for visibility, burning dependability and economy in cost and fuel consumption.

Clamps for Column Forms

812 Complete data and prices on the W. A. K. One-A-Minute clamps for column forms which have only three parts, weigh 1½ pounds, are 4 x 4 inches overall and fit all columns may be secured by those interested from W. A. Kuhlman & Co., Toledo, Ohio.

Precast Egg-Shaped Sewers

813 Egg-shaped sewer pipes can now be purchased in precast form, thus making available the self-cleansing facilities of this type of pipe for smaller sewers. Complete information may be secured from the Mueller Concrete Construction Co., 6620 E. Canfield Ave., Detroit, Mich.